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BULLETIN 86

Sound Control Structures For Jet Engines 4

A timely article outlining Do's and Don'ts in the planning of structures for testing jet engines.

Engineer Says Airports Not Ready To Meet Demands of the Jet Age 6

Adequate runways, service and handling facilities and noise control are some of the problems faced by jet airport administrators.

Jet Airport Construction 7

Runway and taxiway widths, pavement cleaning, lighting, terminal buildings and apron areas are stressed in this condensation of a special government report.

Las Vegas Convention Center 25

Case history of a new and outstanding convention facility.

Photo Study of Public Building Designs 53

Sixteen pages of architectural photography, showing current work in the public building field.

Members of the Producers' Council 96

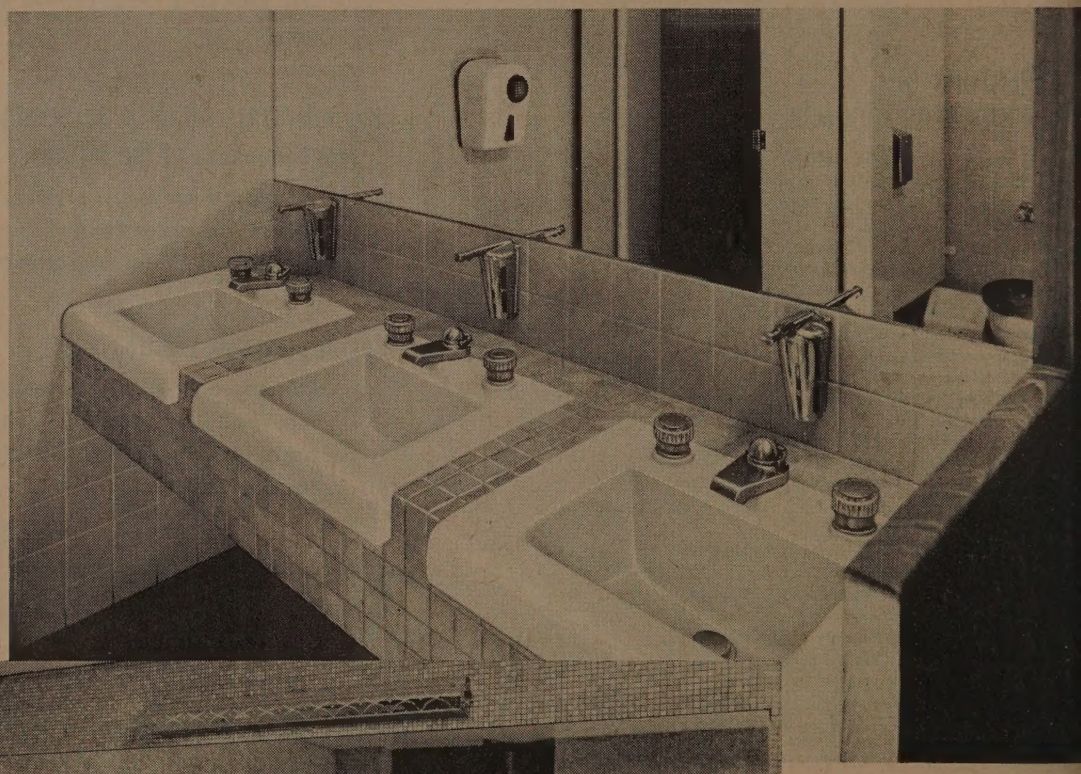
The names and addresses of all manufacturers who are members of the Producers' Council are listed so that you may address all inquiries directly to the manufacturer for complete details about products or services available through them.

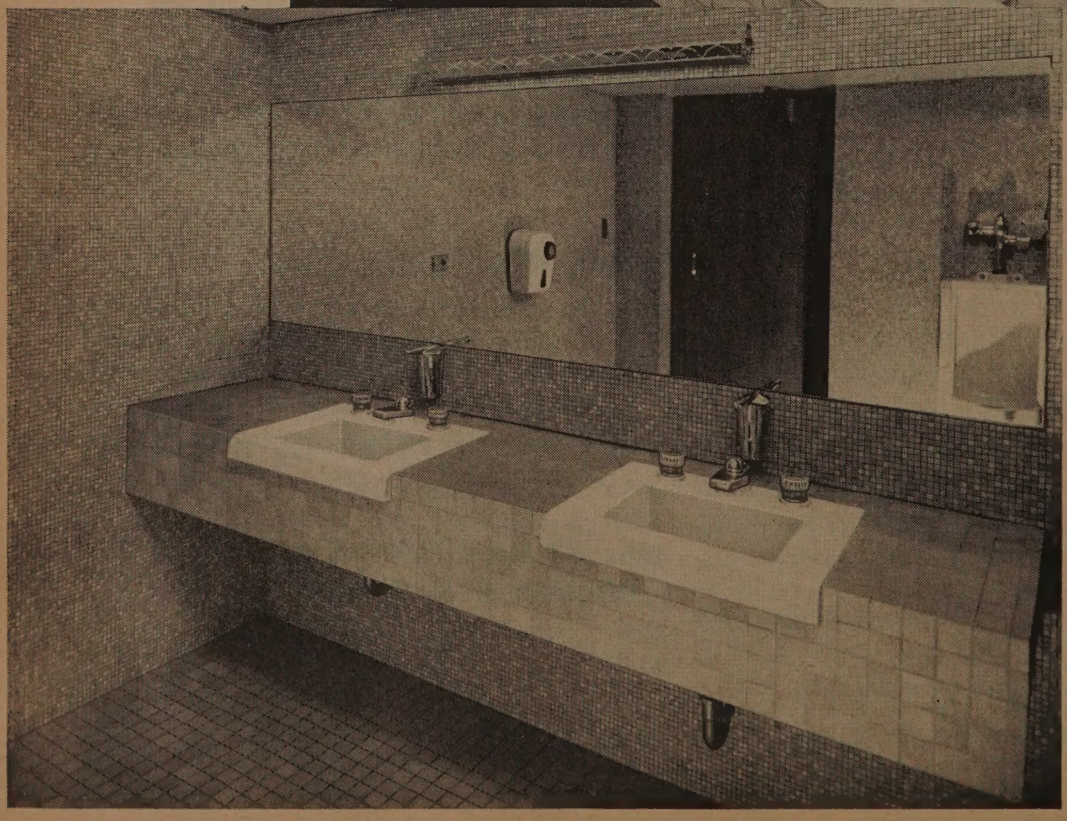
Index of Products, Specifications and Technical Information of this Publication 99

Cover

Santa Monica Civic Auditorium.
Architects: **Welton Becket & Associates**

New shopping provides as modern





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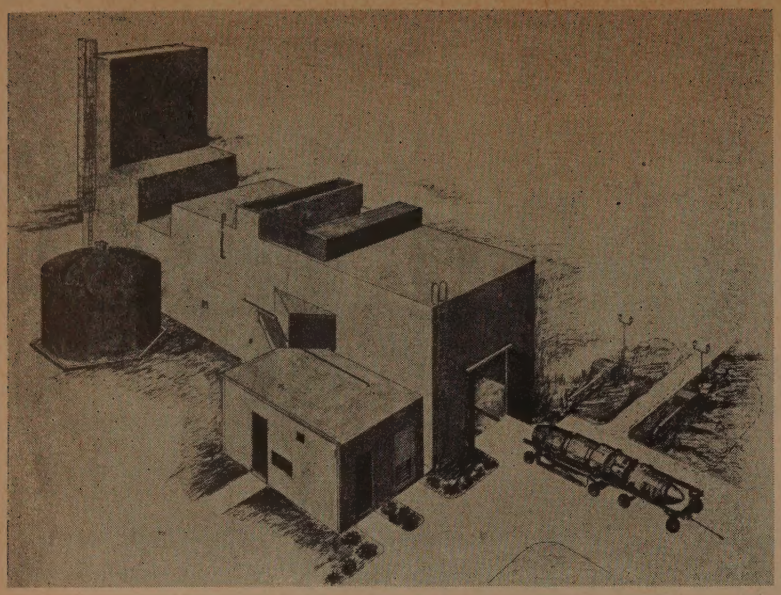


Artist's sketch of an advanced type jet engine sound control test structure. Tank (left) stores water for cooling afterburner exhaust. Control room (lower center) is separate from cell structure. Fuel tanks (right) are underground. The tall exhaust stack (left) and shorter inlet opening (center) are designed for easy conversion to greater capacity to meet future requirements of more powerful engines.

Sound Control Structures For Jet Engines

By **Ben Noble,** President
ITEC, Los Angeles, California

The testing of jet engines is a noisy, necessary job that starts with the manufacturer's full thrust run before delivery and continues at regular intervals as the operator conforms with C.A.A. maintenance specifications for periodic overhaul and re-assemble.

When jet airliners become commonplace, jet engine testing will become a round-the-clock operation. Leading companies, as a matter of course, will require test cells as part of all major maintenance facilities.

Many architects will soon gain their first opportunity to plan jet age structures dealing with extremes of noise, heat and vibration. Perhaps this article can serve as a primer and also indicate a few Do's and Don'ts learned through practical experience.

Fundamentally, the test facility permits the jet engine to be operated on the ground, under safe conditions, while skilled technicians record and analyze its efficiency. Despite the ear-shattering noise generated by jet engines at full thrust, test cells must logically be located at airports—near the planes and the multi-million-dollar maintenance shops already established. Such location is feasible because of the advanced sound-control characteristics of this type of structure.

Three main elements make up a typical jet engine test cell: structure, acoustical treatment, instrumentation. Of course, it is the third element—instrumentation—for which the cell exists; the strength and composition of the building and its scientific sound control system merely tame the noise, heat and vibration so that tests may be conducted. Thus, all elements must be designed after consideration of the ultimate function.

Tests normally include: analysis of the engine's fuel system to determine operating economy; isolation of any source of vibration which might cause component breakdown through fatigue; recording of temperatures —intake, bearings, exhaust, etc., and measurement of thrust—the working power of the engine. The complexity of instrumentation depends on exactly how much the operator wants to know about the engine being tested. This requirement, in turn, will affect the size, shape, location and observation facilities of the control room.

Visual contact is usually provided by means of soundproofed glass observation windows looking into the test chamber. Closed circuit television, while immediately more expensive, can bring into the control room three or more views of the test, depending on the number of monitors and camera locations. For instance, through television, a technician may look into the tail-pipe and also see what is happening on both sides of the engine at the same time.

Under the heading of instrumentation is included a myriad of conduits and wires connecting electronic, pneumatic and hydraulic measuring devices with the test stand. Safety precautions provide automatic interlocking systems to shut off fuel and snuff out fire in case of flame-out or other emergency.

Since delicate instruments may be disturbed by vibration, the control room should be well-insulated from the cell. Experience has shown that it is not wise to have the cell and control room share a common wall or foundation. All connecting ducts should be equipped with isolation pads. This stops noise as well as vibration.

When you consider that the noise of a jet exhaust, even without afterburner, reaches 130 decibels, it seems miraculous that modern sound control techniques can cut the scream down to a mere 60 decibels just outside the test cell's concrete walls.

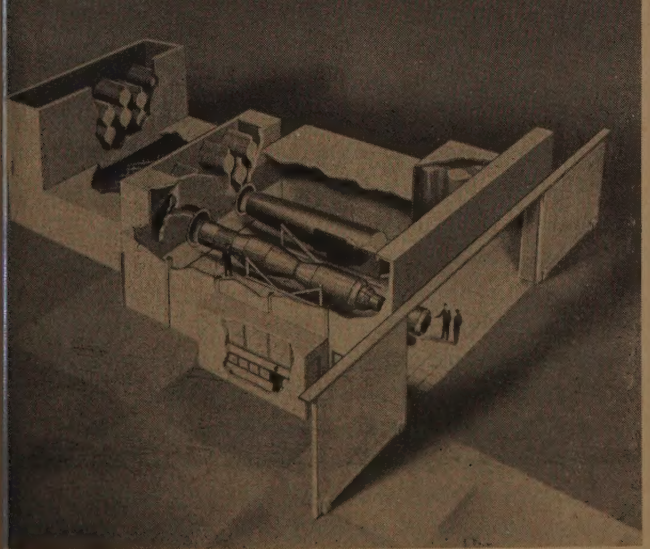
The high density concrete itself helps to contain the noise, usually being 12 inches thick. A variation employs double walls, each perhaps 6 inches thick, and insulated by their separating air space.

Tilt-up concrete panels have proved practical for the sides of the structure, but poured-in-place construction is preferable for the more critical blast area. Here, a brutal, fiery exhaust reaching about 1,200 degrees F. must be absorbed.

The blast-splitter, which presents angled surfaces to the exhaust, is formed of solid, reinforced concrete and may have the extra protection of heavy steel plates. Other systems use steel diversion vanes.

This blast area is especially critical where the afterburner heat of military jets must be contained. Fortunately, the problem is less acute in the case of commercial jets which do not use afterburners.

It may be interesting to note that every jet engine used by commercial aircraft is an adaptation of a particular model developed for the military. Similarly, the design of sound control test structures for commercial operators borrows from lessons learned in providing such facilities for the Army, Navy, Air Force and various companies responsible for the development of military aircraft, missiles and propulsion systems. Architects, engineers and construction firms who have gained experience with such military facilities should be well-equipped to supply the commercial need.



Cutaway illustration of a typical test cell which accommodates two engines. Note the inlet and exhaust sound treatment and the heavy concrete doors.

Some of the most effective structures designed for military testing enclose the entire aircraft—practical where you are dealing with a comparatively small, one-engine ship. However, a multi-engined commercial jet liner, with a 200-foot wingspread and a tail reaching four stories high is a different matter. To enclose such an aircraft would require too ponderous a structure and this is why we can expect that commercial sound control test facilities will be restricted to the engine. Most such cells will be designed to handle at least two engines since experience proves the economy of conducting simultaneous set-up and removal operations.

It is logical to anticipate continuing changes in the size and thrust of engines; therefore, flexibility is a factor to consider in the planning of new test cells. Along this line, one of the military services is currently constructing 10 jet engine test facilities, strategically located throughout the country, each cell designed to accommodate 6 different engines.

According to a report by Koppers Company, the first sound control test cell (designed for reciprocating engines) was built in 1934. During the ensuing years, as jet engines came along with their greater power—and noise—acoustical engineers have been searching for—and finding—ways to control the awesome sound. Koppers' Sound Control Department, for instance, has compiled considerable data on the subject.

Assuming an adequate installation consisting of scientifically contoured baffles and absorbent panels which control inlet and exhaust noise, care should be taken to make sure the cell doesn't have any leaks. You are concerned with so many decibels that even a small opening can destroy the efficiency of a half-million-dollar structure.

Obviously, doors are critical areas. Successful solutions have used double doors of heavy concrete, mounted on rollers and joined by neoprene seals.

Expansion joints can be another problem. Specifications should call for a sealer with a high melting point; temperatures created within the cell can burn out an ordinary asphalt compound and conceivably might trip the automatic sprinkler system.

"Plumbing" can be another noise problem, and it is wise to specify traps for all water drains. This can be done with individual pipes, or it might be more economical to bring them all together to share a common trap that uses a few inches of water as insulation.

Still another sound control necessity which has been too often overlooked by designers of this type of structure concerns the starter cart. Jet engines are started

Continued on the next page

Engineer Says Airports Not Ready To Meet Demands of the Jet Age

Americans may be ready for the Jet Age, but their airports definitely are not.

Within a year, fleets of jet transports will be ready for both overseas and domestic passenger service. But, says Perry W. Etkes, a consulting engineer, of New York, this country's airports will be still in the prop era.

Failure of the Civil Aeronautics Authority to avail itself of the wealth of knowledge on jet operations that the military developed during and since World War Two is the major reasons that our airports will not be ready to handle jet aircraft, Mr. Etkes said.

The major way to solve the situation, he suggested, was close and immediate coordination between civilian and military agencies.

Mr. Etkes listed four basic problems that face airport administrators who plan jet operations: 1) Building runways, taxiways and parking pads able to withstand heavy jet loads; 2) Building safe approach and landing strips; 3) Controlling jet noise, and 4) Providing adequate facilities for servicing and handling of passengers and freight.

All these problems, Mr. Etkes said, must be licked before the nation can enjoy the benefits of jet air travel.

Mr. Etkes' viewpoint is based on experience gained in construction of jet aircraft bases for the U. S. armed forces. He most recently was chief engineer at the largest Strategic Air Command base in Morocco.

In explaining the difficulties confronting the United States in building commercial jet ports, Mr. Etkes described the most critical problems as runways in existing airports. Most are too short to handle the fast-moving jets, he said. Too, their pavements are too thin to support the jets heavy weight.

Beefing up the pavements is a complex job, Mr. Etkes suggested. "Even sub-soil conditions must be studied carefully to gauge possible settling of the pavement under the heavy jet loads," he said.

Because of the jets' high landing speeds, they need perfectly smooth runways to forestall accidents. They need wider and stabilized shoulders along the runways, longer overruns, and blast-pad provisions, among other things.

The approach angle and clear area around airports, inadequate at present, will have to be revised considerably due to the jets' increased speed, the engineer said. For one reason: There will exist a serious problem in "stacking up" in bad weather, for jets burn fuel rapidly.

Excessive jet noise too is a serious problem. New jets will be equipped with noise suppressors, but they reduce thrust, add drag, and increase fuel costs by about five per cent. On the ground, the jets' whine, even reduced by suppressors, will still need to be quieted further with blast walls strategically located around loading areas, Mr. Etkes said.

The servicing of 300,000-pound jets, Mr. Etkes noted, is quite another problem from servicing lighter piston-driven craft. Just moving them about when the pavement is wet or icy presents a problem, he said. Present tractors are not suitable, he said. Too, jets require underground fuel hydrants capable of loading the planes' fuel tanks at the rate of 2,000 gallons a minute, for efficient airport operations. Such hydrants do not exist in our most modern civilian ports. Repairs and engine adjustments also require new facilities.

All of the time that is saved in the air, Mr. Etkes warned, can be quickly lost on the ground in the jet age—if the airport problems are not faced, and conquered, today, before the big jet fleets are put into service.

Sound—Cont'd from page 5

by two methods: electric motor or compressed air. Both create a great deal of heat and noise. If the starter cart is to be used within the test structure, it might well be necessary to provide a manual override to prevent activation of sprinklers. Some cells are designed with adjacent soundproofed cabinets to accommodate the starter cart, and this seems a practical solution.

If this necessarily limited discussion of a complex type of structure is to be of value, it should emphasize the importance of early consultation. Unlike conventional construction, a jet engine test cell must be a finely balanced combination of structure, acoustical treatment and instrumentation, scientifically calculated to handle extraordinary problems of noise, heat and vibration. The first-time designer of such a structure who recognizes the exacting demands of his assignment—and draws upon the hard-won knowledge gained by specialists who pioneered this new field—will avoid mistakes and do a better job for his client.

Jet Airport Construction

The following information, covering pertinent aspects of jet airport construction, has been adapted from "A Report of Progress and Developments on Jet Age Planning" which was prepared by the Civil Aeronautics Administration of the U. S. Department of Commerce. The report was presented to the Subcommittee on Aviation of the Committee of Interstate and Foreign Commerce in May 1958.

Runway and Taxiway Widths

Runway pavements 150 feet wide and taxiway pavements 75 feet in width at recommended design bearing strengths will be adequate for the proposed jet airliners.

Shoulders—The outboard engine pods of the large turbojet aircraft moving along the center line of a taxiway will extend approximately 10 feet beyond the edges of a 75-foot wide full bearing strength taxiway.

Since these aircraft will not always be operated along the actual taxiway center line, shoulder areas should be treated for a lateral distance of 25 feet to prevent ingestion of foreign objects into turbines and prevent creation of objectionable dust conditions. The surfaced area along taxiing routes thus will be 125 feet wide. Holding aprons will also require treatment of shoulder areas 25 feet beyond any edge.

Operationally, it is expected that once a turbine jet type aircraft is cleared for takeoff, it would proceed through a system of taxiways to the runway to takeoff configuration in one continuous flow. Because of this, it is expected that treatment of areas at the end of a runway should not be necessary. If a practice did develop where a runup would occur at the end of a runway, then an area the width of the runway for a distance outward of 100 feet from the runway end would require treatment. Further, except in rare cases, it is expected that shoulders adjacent to runways will not require treatment.

The treatment of the shoulders to reduce the possibility of harmful ingestion, and to support unintended movement of an occasional aircraft, need not consist of a full design strength pavement section. The section should be designed with a recognition of prevailing climatic influences and should provide a surface free of loose particles and requiring a minimum amount of maintenance. Shoulder treatment consisting of a 1½-inch bituminous concrete surface course placed on a base at least 4 inches thick should satisfy these requirements. The base may be sand clay base, caliche base course, aggregate base course or nonplastic select granular gravel. The bituminous concrete surfacing should never be placed on the natural soil unless such soil meets the requirements at least equal to those for a subbase material.

Pavement Cleaning

Because of the possible harm which can result from ingestion of foreign objects into turbine engines, the pavements at airports to accommodate aircraft so powered must be kept free of debris or litter.

Several high-capacity suction-type pavement sweepers are available commercially. These sweepers are capable of removing virtually all objects which are found from time to time on airport pavements. The cleaners can be operated at reasonably high speeds and have advertised capability of sweeping 1 million square feet of pavement or more per hour.

Smaller sweeping units, employing rotary brushes supplemented with suction action, may also be employed for sweeping pavements where jet aircraft operate. Although these smaller machines cannot compete, capacity-wise, with the large, high-speed cleaners, they are much more maneuverable and consequently will be able to negotiate congested areas where the larger equipment cannot operate. Although the available smaller sweepers do not remove heavy individual objects so well as the high-capacity vacuum sweepers, it is doubtful that items which the smaller sweepers fail to pick up would be picked up by a jet engine as mounted on the proposed civil jet airliners. Removal of objects which might harm tires is obviously desirable, but such a requirement exists for all wheeled aircraft regardless of type of propulsion.

Lighting

Experimental work is being undertaken to develop improved lighting of the turnoffs from runways into the throats of exit taxiways. At the CAA Technical Development Center in Indianapolis, a test project has been initiated. This project will test and evaluate the effectiveness of centerline flush lighting in providing guidance to aircraft turning into exit taxiways at night, and during restricted visibility conditions.

Except for augmenting the lighting of entrances to high-speed taxi turnoffs, and the area between threshold and touchdown, it is not foreseen that additional problems with respect to lighting will arise as a result of the introduction of turbine-powered aircraft.

Terminal and Apron Areas and Buildings

The handling of jet aircraft in the terminal ramp and building areas is probably the most critical operating problem associated with the capacity of an airport to accept jet aircraft. The following three methods have been considered:

1. Taxi-in and taxi-out under power.
2. Taxi-in under power and tow-out.
3. Tow-in and tow-out.

Continued on the next page

Some operators have indicated their intention to operate aircraft in these areas under their own power while others are considering taxi-in under power and tow-out. The civil jet manufacturers have generally demonstrated the feasibility of moving jet aircraft in the ramp area both under power and by towing. The demonstrations showed that the high frequency compressor whine emanating from the engine intake under taxiing conditions causes the major discomfort. The compressor whine, because of its high frequency content, is quite directional and can be attenuated by relatively thin panels placed to obstruct the direct line of sight into the engine intake. Thus, reasonable soundproofing against compressor whine can be attained in terminal buildings by conventional construction, provided airtightness is achieved at least on the field side of the building. This will also provide some reduction of the lower frequency exhaust noise. However, soundproofing of the lower frequency exhaust noise requires more careful acoustical treatment.

Normal wall construction of brick and hollow tile 8 to 12 inches thick has sound transmission loss values ranging from 35 to 55 decibels. But the sound intensity generated by a large turbojet aircraft on the apron at a distance of 100 feet may reach 140 decibels in frequency ranges of 128 to 2,048 cycles per second. And, for each doubling of that distance, the reduction in sound intensity is only about 6 decibels. Therefore, it will be necessary to design wall sections with relatively high transmission loss values, say 50 to 60 decibels, in order to achieve what might be regarded as a tolerable range, i.e., 80 to 90 decibels inside the building. Thus, it is apparent that in planning new construction an acoustics engineer should be consulted during the early stages.

Window and door openings on the field side of terminal buildings and fingers can be designed to reduce sound transmission to a considerably greater degree than is done in current practice. A single thickness of glass has a reduction factor of approximately 30 decibels, whereas a double thickness of glass with 3 inches of airspace between panes may approach a sound reduction value of about 50 decibels. The use of double windows properly sealed, and double doors (vestibule arrangement) should be considered. It would be well also to consider windowless walls in fingers and in portions of the terminal building nearest the areas where jets will park.

The velocities of engine exhaust blast are most critical in starts from parked positions and in short radii turns, and may have an adverse effect on people-and-baggage-handling operations at adjacent parking positions that are in the wake of direct blast. To minimize these factors, it may be necessary to install blast fences between gate positions. Although this is a step in the right direction, it must still be determined that such fences are fully effective and will not seriously obstruct operations in the area. The heat effect during ramp maneuvers is not considered to be a critical factor. The blast tolerance will normally be a more critical factor since persons receive warning of the heat conditions by the high velocity of the blast before the heat would prove harmful.

Elimination of noxious fumes also involves control of wall openings on the field side of the terminal building. Full protective measures will be provided enplaning and deplaning passengers only with the development of a mobile passenger ramp from gate opening to aircraft door.

With the gradual introduction of turbine-powered aircraft into service, their requirements should be taken into account at all airports which will eventually be handling them along with piston-engined aircraft. This is desirable even though the amount of jet traffic may remain small percentagewise for some time to come.

Considering the configuration of the apron in light of its effect on passenger comfort, safety of operation, speed, and economy, an important factor is the choice of parking arrangements. This is controlled by the number and type of aircraft to be handled, passenger convenience and comfort, terminal configuration, and characteristics of the aircraft. There are three generally recognized types of apron parking system layouts: open apron, finger, and frontal systems.

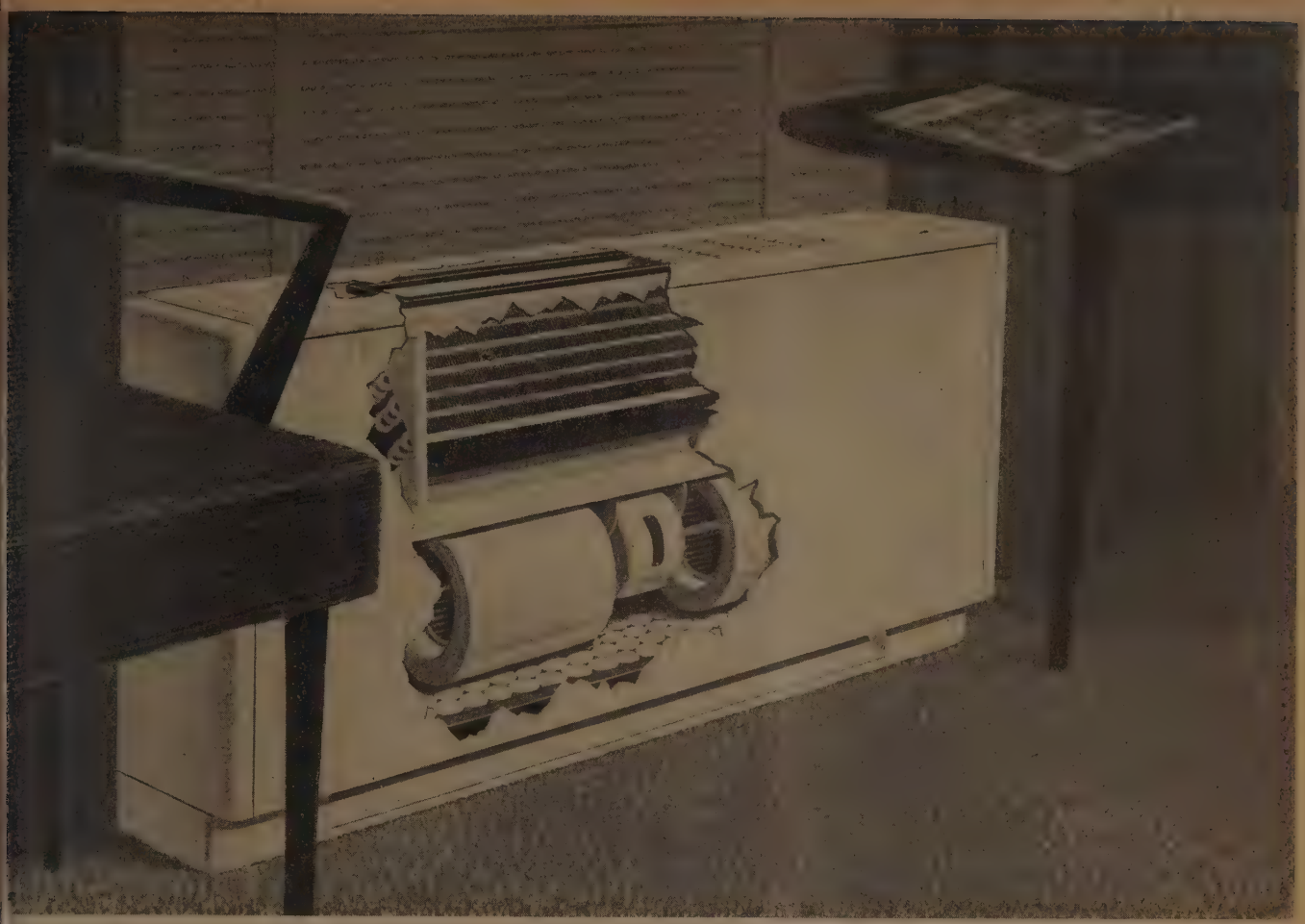
Where finger configuration exists with relation to the main terminal building, it would appear desirable to reserve those gate positions which lie at the end of the fingers for the parking of jet aircraft. If terminal area master plans reflect future finger construction, it would be desirable to plan the more remote gate positions for the turbojet aircraft. In stances of frontal configuration, it would appear desirable to reserve for turbojet aircraft those gate positions farthest removed from the main terminal building.

Parking positions where taxi-in taxi-out procedures are used will require sufficient clearance not only for maneuvering but for dissipation of blast effects. Under these conditions, circular areas 180 to 220 feet in diameter would appear to be the minimum requirement. This dimension gives spacing which will allow aircraft to accelerate about 10 feet in a straight line before beginning a turn, thus minimizing the power required to break starting friction. Parking positions should be such as to provide a minimum clearance of 25 feet from buildings.

In the use of taxi-in taxi-out or tow-in tow-out methods, the space of the gate positions would need only to provide sufficient wingtip clearance for direct entry. The berthing requirement under this arrangement would be in the neighborhood of 180 feet per aircraft.

Manufacturers have been developing tugs and wheel-moving equipment, self-started and self-propelled, which appear to have merit. Such equipment will travel at reasonable speed in parking areas while still giving the pilot full control of the aircraft. Certain designers have been considering the development of a flat bed trailer concept which would permit the aircraft to roll onto the trailer at a relatively remote point from the terminal area. From this point, the aircraft would be moved on the trailer to and from loading and unloading gate positions.

Continued on page 14



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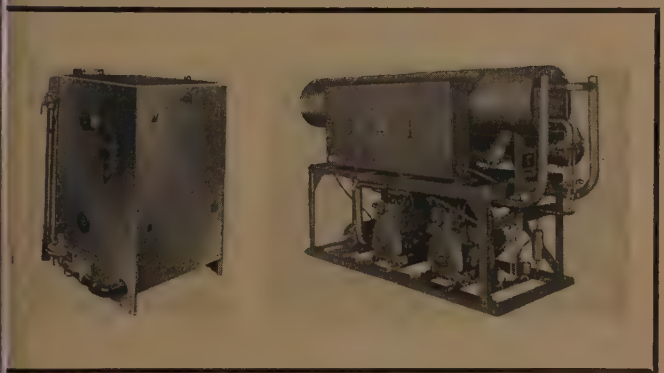

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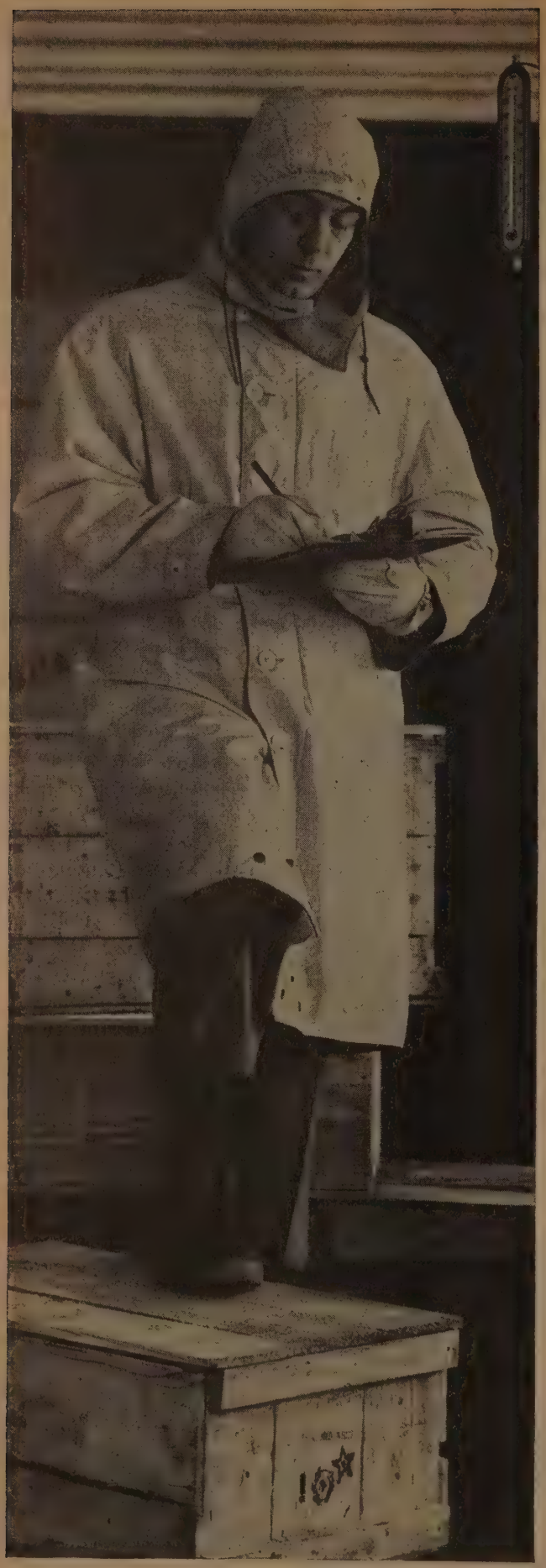

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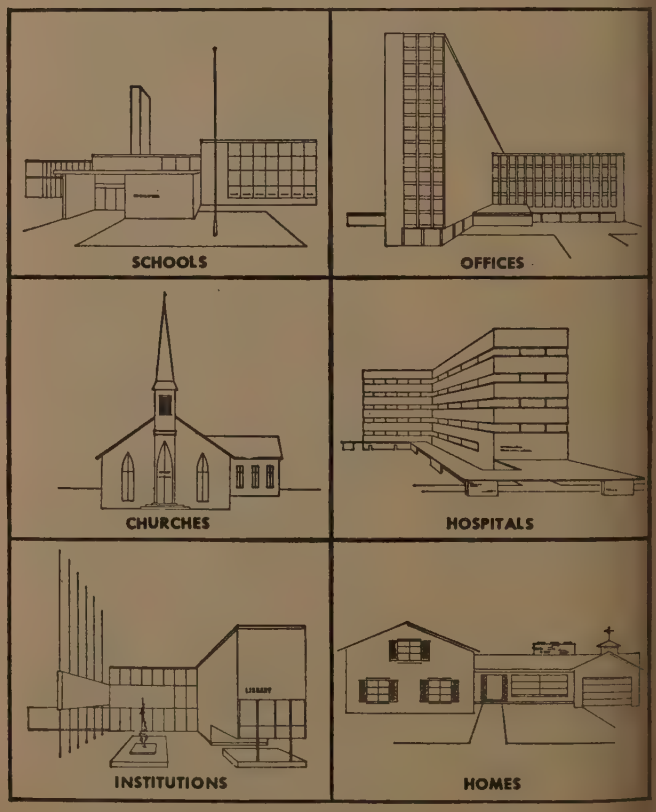

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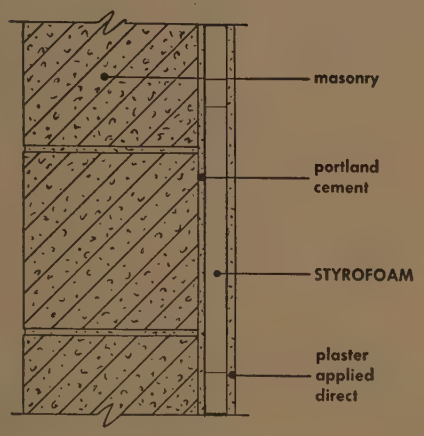

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Jet Airport—Cont'd from page 8

The handling and operating of turbine-engined aircraft with precision in apron areas is of paramount importance. It appears that the pilot will not be able to gage wingtip clearance without some type of visual aid. This need increases with the degree of sweepback of the aircraft wings. The best guideline configuration appears to be a single line to be followed by the nose wheel of the aircraft. Main wheel guidelines used to date considered ineffective by those test pilots who have tested them.

Though considerable progress has obviously been achieved, studies must be continued to fully resolve the problems of handling jet aircraft at the terminal so that the airport owner and/or operator, the operators of the aircraft, and the passengers will all be satisfied.

Fixed Services on the Apron

Successful operation of turbine-powered aircraft is dependent upon maximum utilization. To achieve this, time on the ground at enroute stops and turn-arounds must be held to a minimum. As the airspeed increases, minimum ground times become more important, since the passenger is interested mostly in his origination and termination times. As apron congestion is already a problem of many airports, which increases ground time, it is evident there will be a need for replacement of some services now provided to the aircraft by mobile equipment. Fixed services available at the aircraft parking position could improve this condition. It is important that apron parking plans be firmly established so that fixed servicing facilities on the apron may be planned for their ultimate location.

There has been little consistency in positioning the various ground-servicing connections on the different aircraft types. It therefore appears that fixed servicing installations would only be justified for a few of the major services at a parking space to be used by more than one type of aircraft. The exception would be an airline with a high volume of traffic at an airport having exclusive use of a particular parking space. Under this arrangement, more extensive use of fixed servicing installations may be justified.

The various fixed services which should be considered are:

Fuel—In keeping with stepped-up airspeed necessitating shortened ground handling time, the present and future fueling facilities must contribute time saving increments by expediting fuel delivery. In view of the increased fuel requirements of jet aircraft and the encouraging trend toward simplification through underground fueling service, such service should receive thorough consideration in connection with airport fueling requirements. The cooperation of the airport authorities and the aircraft operators in establishing organized aircraft parking is necessary for the success of a fixed fueling system.

Basically, fixed fueling facilities may be either pits or hydrants, although present thinking favors hydrant systems; these have been in use at some airports for a number of years. With current fueling equipment, good design practice limits the fueling rate per hose to 300 gallons per minute with maximum fueling and surge pressures at the fueling nozzle of 35 and 100 pounds per square inch, respectively. There are, however, some types of aircraft that dictate the use of other flow rates and pressures.

Electrical ground power—Auxiliary electrical power for the aircraft is required on the apron for several purposes prior to engine starting. Some aircraft require electrical ground power for starting the engine with starting equipment loads varying from 24 volts direct current at 1,300 amperes to 120 volts direct at 650 amperes. Maximum standing loads during servicing vary with the aircraft from 15 kilovolt-amperes to 125 kilovolt-amperes either alternating current or direct current.

In certain cases, it may be preferable to provide this power through fixed installations. The use of this method would reduce the noise on the apron by eliminating the mobile power unit.

Communication—Either telephone service or short-range radio equipment is desirable at each gate position on the apron.

Water—Installation of fixed water service may be justified at some locations but because of difficulties in meeting purity standards, it is unlikely that a fixed service could be used for supplying potable water to the aircraft.

Due to the limited quantities of demineralized water required for engine use during takeoff and due to the strict specifications of the water, the installation of a fixed system for this type of water is not considered practical at this time.

Compressed air for starting—Some aircraft have self-contained compressed air systems for starting. Others require external equipment. In the interest of eliminating one more piece of equipment on the apron and in providing economies in the long run, consideration should be given to fixed compression air service at high frequency terminals.

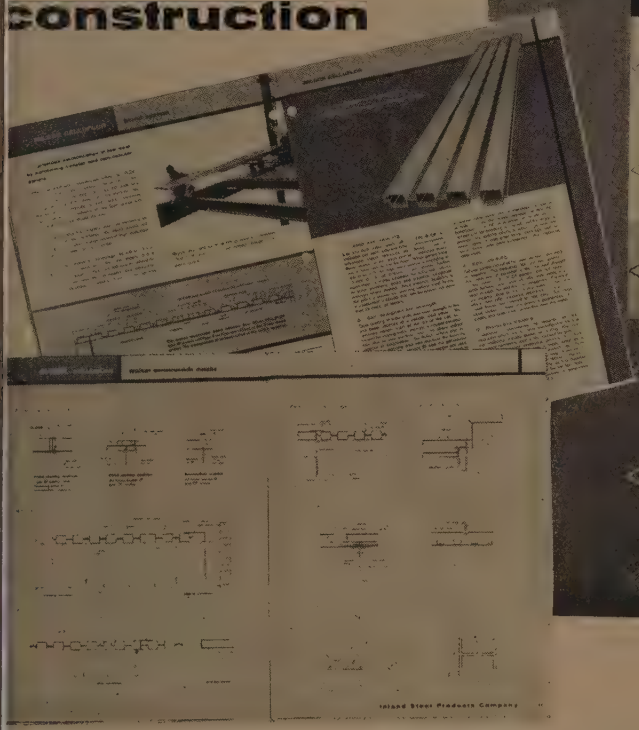
Aircraft air conditioning—Some of the new turbine-powered aircraft will have a self-contained cabin air conditioning system which will operate effectively on the ground. Other aircraft, particularly at airports in extreme climates, may require remote air conditioning service.

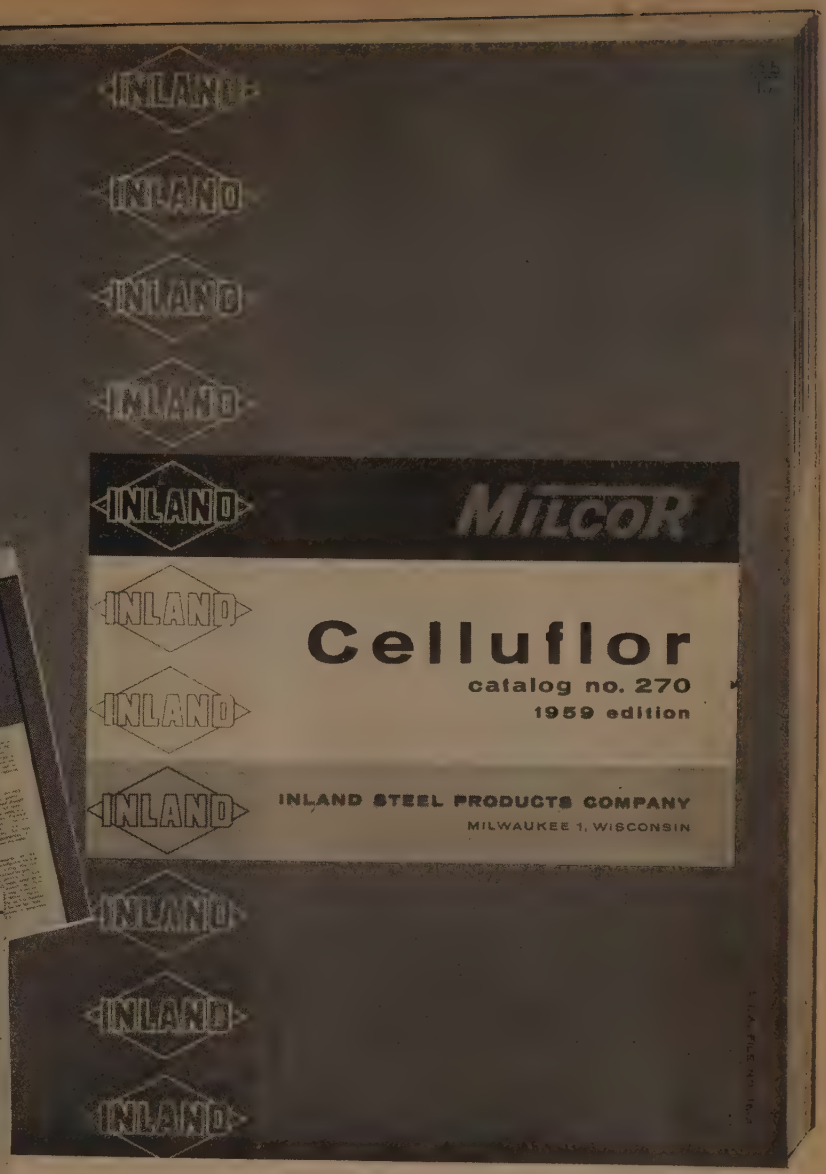
A fixed installation supplying the volume of air necessary for the large turbine-engined aircraft poses problems as this involves lengthy and bulky supply conduits and, therefore, may not be economically justified.

Aircraft sewage disposal—This facility is not required at the parking stand. A centrally located disposal facility should be provided in an area removed from passenger routes to reduce the distance the disposal carts will be required to travel.

Continued on page 1

Comprehensive reference book on **cellular floor construction**





Milcor Celluflor Catalog 270

The list of subjects in the index suggests how valuable this catalog can be as a working tool for you:

Construction details	**Fireproofing**
Description	**Load tables**
Economical blend system	**Panel features**
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Specifications, section properties; load tables for wet concrete, unreinforced concrete slabs, reinforced concrete slabs, insulating concrete slabs; application diagrams; other information.

Catalog 280

Milcor Hollow Metal Doors

Specifications, size tables, installation details, application diagrams, hardware information, other facts on heavy commercial, light commercial, and commercial hollow metal doors.

Catalog 202

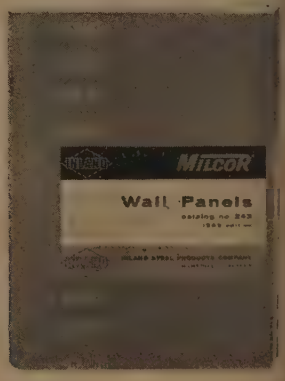
Milcor Metal Lath and Accessories

Specifications, support and loading tables, other information on Milcor metal lath, cold-rolled channels, membrane fireproofing, partition systems, and lathing accessories.

Catalog 240

Milcor Steel Roof Deck

Specifications, load tables, section properties, application diagrams, installation details, and information on accessories — cant strip, ridge and valley plates, sump pans.



Catalog 243

Milcor Wall Panels

Specifications, girt-spacing table; diagrams on end detail, head detail, sill detail, end-lap detail, curb detail, corner detail; other information on Milcor wall panels for siding and insulated walls.

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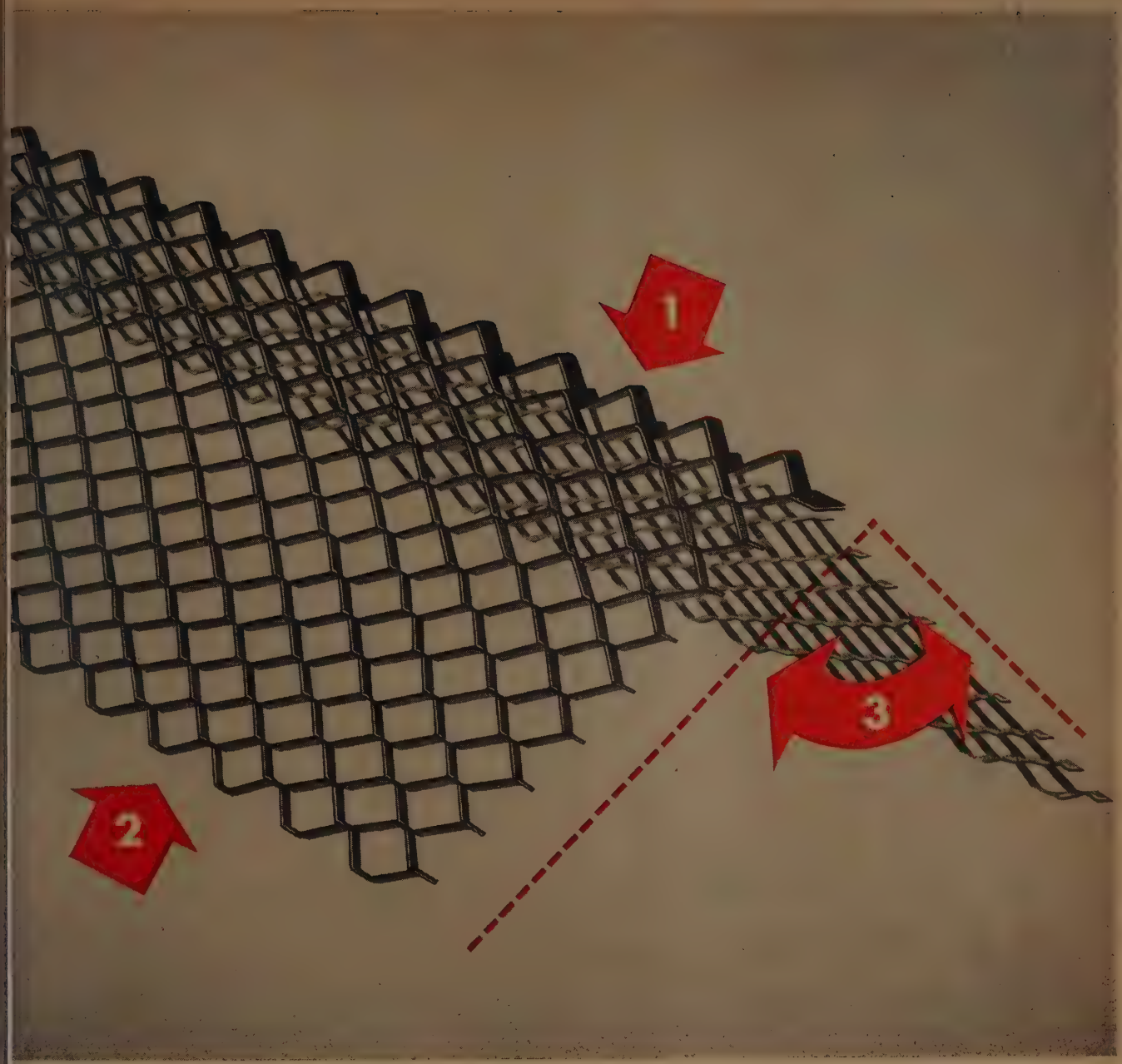

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Jet Airport—Cont'd from page 14

Runway Lengths

It is not realistic to require runway lengths at every airport location on the basis of the maximum gross takeoff weight for the most critical aircraft under the most critical conditions. It is possible, at certain airports where full utilization of the turbojet aircraft will occur, that economic and operational factors will justify the operation of an aircraft at maximum allowable takeoff and landing weights. However, it follows from a general application that each airport will have to be examined relative to runway length requirements in terms of the type of aircraft using the airport, taking into consideration stage length and operational factors concerned therewith.

To estimate desired takeoff weights at a specific airport, the following operational factors require intensive and accurate consideration.

1. Weight over destination (fuel needs in terms of time).
2. Cruise control procedure.
3. Stage distance.
4. Winds at flight altitudes.
5. Air temperatures at flight altitudes.
6. Availability of air traffic control, navigational aids, and optimum flight path.
7. Individual engine and airframe variations.
8. Surface air temperatures at airport.
9. Surface winds at airport.
10. Elevation of airport.
11. General meteorological conditions at airport.
12. Topographic conditions at airport.
13. Necessities of gradient in runways.
14. Any operational judgment factor.

As has been stated in Jet Age Planning Progress Report No. 2, as well as in other publications and statements, fuel load adjustments are a major factor affecting takeoff weights which in turn dictate runway requirements under established conditions ascertained by applying the above factors.

The data now being used to establish weight and runway requirements have not been fully firmed up and are not acceptable to all concerned.

The reasons for this are that further considerations must be given to power losses resulting from sound suppressor and thrust reverser devices. The figures quoted at present vary considerably. A general consensus shows that these factors, augmented by variations in same type powerplants and airplanes, would indicate an increase of 7 to 10 percent of runway length beyond those now generally being quoted. Further, aircraft growth factors will need more realistic predictions so that proper provisions may be made.

In view of the above conditions and facts, it is quite evident that a definite fixed basic runway length at sea level, standard temperature, no wind and no gradient conditions, applicable to every airport, cannot be established. Conversely, it appears that in order to establish a basic planning and design tool, recognition will need to be given to a range of basic length requirements.

To establish such a range of basic runway length requirements it is essential to consider the situation which requires provision of a length necessary for touchdowns with maximum allowable landing weights. These requirements must then be coupled with those needed for maximum allowable takeoff weights. Together with the requirements full consideration must be given to the airframe and powerplant configurations of the various aircraft which will be in service.

Estimates which have not been substantially proved indicate that basic lengths (standard temperature, sea level, no wind, no gradient) for airport planning purposes may vary from 7,300 to 9,700 feet. The length within this range for any one specific airport will depend upon the evaluation of factors previously discussed. While no definite figures are yet available, indications are that basic runway requirements for domestic service operation will be generally less than those required at airports affording long haul international air service. The basic lengths will increase at each specific airport where corrections are necessary for altitude, temperature, and effective gradient. At present, the accepted correction factors for altitude and gradient for piston-engined aircraft appear to be applicable for runway determinations where turbine-powered aircraft will be used. The recognition of 100-percent temperature accountability has caused an intensive study of the length correction factor for temperature.

In summation, it is apparent that basic length is not a single number applicable to every airport but will vary within a range established by operational factors which will determine required minimum takeoff weights up to maximum allowable takeoff weights which in turn will permit sound economic operations.

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The advantages to architects of the full-scale mock-up

Full-scale mock-ups play a major role in the planning of many of today's large buildings, for they enable the architect to pretest design concepts and compare structural materials under typical conditions. And the architect can show his client precisely how components of the finished building will look and function.

Mock-ups are usually designed to permit the study of both interior and exterior elements. A mock-up, of course, is costly, but because it helps insure a superior finished job, it is a wise investment.

When specifying resilient floors, mock-ups are valuable to architects in three main ways: for comparing various types of floors, for evolving floor designs, and for getting client approval. Here is a brief run-down on the advantages of mock-ups, with notes on how they relate to selecting the most suitable resilient floors.

Pretesting comparative materials

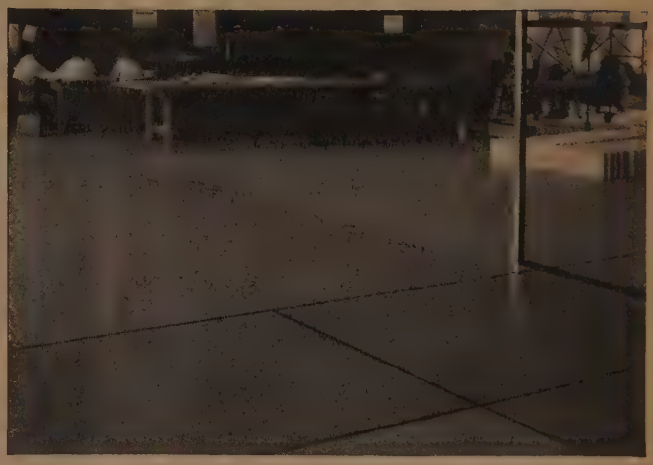
In the mock-up the architect can test various types of materials under strictly controlled conditions, which may exactly simulate those of the finished building. He can also investigate the interactions of different combinations of structural and design elements. With resilient floors, the architect might, for example, analyze physical properties such as indentation resistance under specific loads. And he might compare the effects of different lighting systems on one particular floor styling.

Pretesting design concepts

The architect can also test his ideas about design and plans "on the job." And it's a good opportunity to explore new approaches. Using a full-scale mock-up offers obvious advantages over planning on paper or in small models and eliminates wasteful trial-and-error procedure in actual construction. With resilient floors, this phase of testing could be a matter of comparing different colors and styles; of working out custom designs in tile or sheet goods; of experimenting with underlayments.

Getting client approvals

Inspecting the full-scale mock-up gives the client the true "feel" of his new building. He can see for himself how well it will serve his needs—and how the finished interior and exterior will look. The mock-up may well help the architect overcome any doubts the client may have about specific features. And it simplifies the client's job of choosing between different materials and interior arrangements. And the architect can effectively prove why he chose a particular type and color of resilient floor.



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Technical assistance for you

No matter what your project, the Armstrong Architectural-Builder Consultant in your area will be glad to help you choose the most suitable floors. Because Armstrong makes all kinds of resilient floors, this specialist can offer unbiased advice. And he can obtain further assistance from the Armstrong Bureau of Interior Decoration and the Armstrong Research and Development Center. Call him at your Armstrong District Office or write to Armstrong Cork Company, Floor Division, Lancaster, Pennsylvania.

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Primary consideration in the selection of resilient floors should be given to the type of subfloor and to the service required of the finished floor. As the table below indicates, new formulas and manufacturing methods have increased the usage of Armstrong Floors making many of them suitable for grade and below grade as well as for suspended floors. These improvements also have increased the serviceability of thinner gauges of Armstrong Floors—with the advantage of lower costs.

Armstrong makes all types of resilient floors to meet virtually every requirement and can offer unbiased recommendations. For complete data about resilient floors, write *Armstrong Cork Co., Floor Div., Lancaster, Penna.*

Type of Armstrong Flooring Material	Over-all Gauge	Wear Layer Thickness	Suggested use indicated by gray areas. Heavier gauges eliminated where thinner gauge represents a more economical value					
			Above Grade	On Grade	Below Grade	Heavy Traffic	Medium Traffic	Light Traffic
ASPHALT TILE	3/16"	3/16"	■	■	■	■		
	1/8"	1/8"	■	■	■		■	■
EXCELON TILE (Vinyl-Asbestos)	1/8"	1/8"	■	■	■	■	■	■
	Service Gauge	1/16"	■	■	■			■
CUSTOM CORLON TILE (Homogeneous Vinyl)	1/8"	1/8"	■	■	■	■	■	■
	3/32"	3/32"	■	■	■		■	■
RUBBER TILE	3/16"	3/16"	■	■	■	■	■	
	1/8"	1/8"	■	■	■		■	■
LINOTILE	1/8"	1/8"	■			■	■	■
CORK TILE	5/16"	5/16"	■	■		■		
	3/16"	3/16"	■	■			■	■
CUSTOM VINYL CORK TILE	1/8"	1/8"	■	■			■	■
*OPALESQ TILE (Vinyl)	1/8"	1/8"	■	■	■	■	■	■
CORLON (Sheet Vinyl)			**Above Grade**	**On Grade**	**Below Grade**	**Heavy Traffic**	**Medium Traffic**	**Light Traffic**
* Tessera (Hydrocord Back)	.090"	.058"	■	■	■	■	■	■
Decoresq (Armofelt Back)	.070"	.030"	■					■
Decoresq (Hydrocord Back)	.0625"	.030"		■	■			■
* Futuresq (Armofelt Back)	.070"	.030"	■					■
Granette	.070"	.030"	■					■
Terrazzo (Armofelt Back)	.070"	.030"	■					■
Terrazzo (Hydrocord Back)	.0625"	.030"		■	■			■
Mosaic (Armofelt Back)	.070"	.030"	■					■
LINOLEUM			**Above Grade**	**On Grade**	**Below Grade**	**Heavy Traffic**	**Medium Traffic**	**Light Traffic**
Battleship, Heavy Gauge	.125"	.090"	■			■	■	■
Plain, Heavy Gauge	.125"	.090"	■			■	■	■
Plain, Standard Gauge	.090"	.050"	■					■
Jaspe, Heavy Gauge	.125"	.090"	■					■
Marbelle, Heavy Gauge	.125"	.090"	■			■	■	■
Marbelle, Standard Gauge	.090"	.050"	■					■
Textelle, Heavy Gauge	.125"	.090"	■			■	■	■
Royelle, Standard Gauge	.090"	.050"	■					■
Embossed Inlaid, Craftline, & Spatter—Standard Gauge	.090"	.050"	■					■
Imperial, Heavy Gauge	.125"	.090"	■			■	■	■
Imperial, Standard Gauge	.090"	.050"	■					■

We acknowledge the assistance of The American Institute of Architects in editing the subject matter and form of presentation.

Las Vegas Convention Center

Photo: Julius Shulman

Architects: **ADRIAN WILSON & ASSOCIATES**
Consultant: **HARRY HAYDEN WHITELEY**
Acoustical Consultant: **DR. VERN KNUDSEN**
Electrical-Mechanical Engineer: **J. S. HAMEL**
Structural Engineers: **BRANDOW & JOHNSTON**
General Contractor: **LEMBKE CONSTRUCTION COMPANY**

Built for the Clark County Fair and Rrecreation Board, the Las Vegas Convention Center is situated on forty acres of land and will cost $4,500,000, exclusive of equipment and landscaping. Total area of the building is 275,285 sq. ft.

The main assembly hall will be a circular building 267 feet in diameter with a dome roof and connected with meeting rooms on the north and an exhibit hall 250 feet by 360 feet on the south.

Vital statistics on some of the main features are listed below:

Main Assembly Hall

a) Main floor (portable seating)	3,206
b) Balcony (fixed seating)	4,414
Total Main Assembly Hall seating	7,650

(Main floor provides seating for 1500 banquet guests.)
By extending portable seating into the Main Lobby, an additional 1100 seats can be used in conjunction with the 7,650 seats in the Main Assembly Hall, bringing the total up to 8,750.

Main Exhibit Hall

Portable seating capacity for horse shows, ice hockey, etcetera ____ 5,860
(Main Exhibit Hall provides seating for up to 5,000 banquet guests.)

Meeting Rooms

Meeting Wing

1 room accommodating	1,000 for meetings 500 for banquets
4 rooms each accommodating	235 for meetings 120 for banquets

These can be used individually or jointly by opening sliding doors as:

a) 2 groups each accommodating	470 for meetings 240 for banquets
b) 1 group accommodating	705 for meetings 350 for banquets
1 group accommodating	235 for meetings
c) 1 group accommodating	950 for meetings 475 for banquets

Off Main Concourse

8 rooms each accommodating	60 for meetings (or less)

These rooms are usable as committee meeting rooms.

Exhibit Hall

2 rooms each accommodating	446 for meetings
2 rooms each accommodating	282 for meetings
Each 2 opened into 1 accommodating	565 for meetings 280 for banquets

These four rooms are openable by folding doors into a continuous exhibition area, 42 ft x 335 ft, or approximately 14,000 square feet.

All meeting rooms may be used as exhibit spaces. Concourse and lobbies may be used as exhibit areas as well as circulation spaces.

Area of Concession spaces:

a) Assembly Hall	396 sq ft
b) Exhibit Hall	704 sq ft
Total (This can be supplemented by portable concessions)	1,100 sq ft
c) Concession prep. and storage, vendor pick-up area	4,200 sq ft

Storage and Maintenance Shops area:

Assembly Hall and Exhibit Hall, approximately	15,572 sq ft

Mechanical and Electrical Equipment area:

Total, approximately	13,140 sq ft
Attic Space	2,160 sq ft

The attic space over the Assembly Hall provides a circular balcony containing space for press boxes, television cameras and rigging platform, also spotlight and film projection rooms. The ceiling is furred down and conceals air-conditioning apparatus, and lowers the air-conditioning operational cost by decreasing the building volume. It also provides for additional insulation and for relamping of electrical fixtures.

Exterior improvements:

a) Parking areas can be developed to accommodate 1,800 cars or more.
b) The main approach is a divided street from highway to the front entrance. Special lighting and planting are provided for the entrance driveway.
c) Allocated space is provided near front entrance for parking hotel buses.
d) The surrounding areas are planned for walks, special lighting and planting.

Continued on page 28

Saratoga Building Gets Finest Power Distribution Equipment...

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General Contractor: R. P. Garnsworth & Co. Inc.
Architects: Herbert A. Benson and George J. Riehl
Electrical Engineers: Louis N. Goodman & Assoc.
Electrical Contractor: Weisfeld & Son

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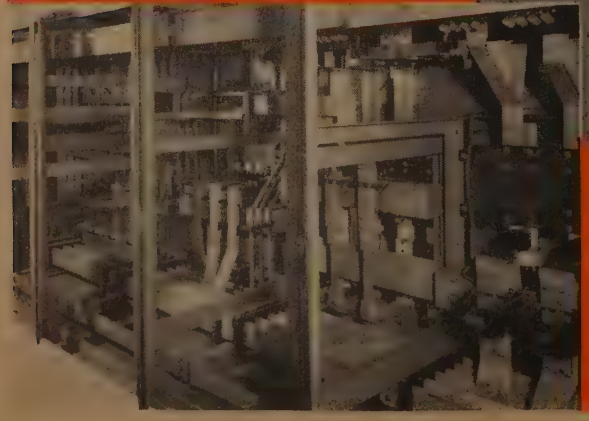
28 feet long! This Ⓕ switchboard was designed to handle all the service for the 14-story Saratoga Building with ample room for future increased load, including a 2000-amp. main for air conditioning, a 2000-amp. house main, and a 3000-amp. tenant main.



Rear view of switchboard shows reinforcing of bus bars and easy accessibility to rear of board by use of expanded steel doors.

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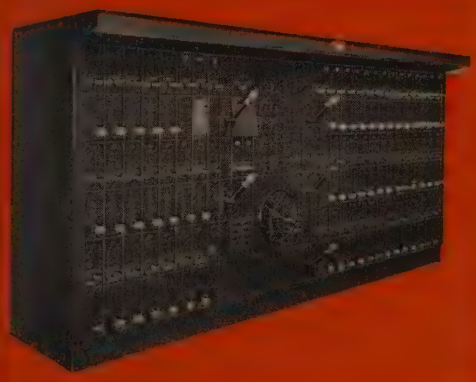
FA STAGE LIGHTING CONTROLS



TYPES OF CONTROL SYSTEMS

- Manual switching and dimming
- Modified remote switching and manual dimming
- Full remote switching and manual dimming
- Multiple pre-set switching and manual dimming
- Remote switching and remote dimming

Dimmer Types Available

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- Electronic tube
- Magnetic amplifier

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Photo: Julius Shulma

Structural Engineering

1. A soils test specification was prepared together with a plan showing test hole locations to enable the County to secure soils tests and report. The foundation design followed results shown in the soils investigation report.

2. There is a probability of sub-surface water and a flash flood consideration. The structure is designed with that in mind.

3. The building is designed structurally for wind loads and earthquakes, and an analysis was made to obtain the best economics of the stresses in combination.

4. The building is designed with a steel frame system with concrete balconies, steps and seat supports. Exterior finish, depending on design, is plaster, concrete block, masonry grille and porcelain enamel siding. A cost study was made on a roof structure of structural concrete compared with a roof of structural steel members. The structural steel system proved more economical.

5. The roofs are topped with 2½" insulation. This will serve as thermal insulation.

6. The dome roof is structurally designed to carry a suspended ceiling with catwalks in the attic space for access to air-conditioning equipment, lighting fixture supports, etcetera. The ceiling is of acoustic plaster.

7. The main floor is designed to support heavy loads—exhibits, etcetera.

Electrical Engineering

The electrical engineering work is divided into three (3) categories: (a) Lighting, (b) Power and Circuiting, (c) Broadcasting and Communications.

Lighting

1. The exterior of the building and surrounding grounds are lighted for viewing from the ground and from the air. It is desirable that lighting should be effective from the air also because the site is beneath a heavily traveled inter-continental air route.

2. Special theatrical illumination is provided for the Assembly Hall for proper effect during exhibitions, boxing matches, and other entertainment. Lighting of the Assembly Hall includes general illumination and special lighting. Special effects lighting will be controlled from a control console located on the east side of the balcony.

3. The remainder of the building is lighted in the conventional manner with switching arrangements so that various parts of the building may be used separately.

4. Convenience outlets are strategically located as a power source for cleaning equipment, various exhibit displays, etcetera.

5. Voltage will be 120/208 or 110/220 with ample panels. Studies were made to assure the most economical and feasible distribution of service.

Power and Circuiting

1. An economic study was made to determine the feasibility of underground service as well as a study relative to acceptance of high voltage transformers at the site to obtain maximum economy.

2. An engineering analysis was made to determine the most economic method of power distribution.

3. Reasonable provisions were made for future expansion of electrical service.

4. The engineering design provides power for all motors for all parts of the work carefully coordinated with other engineering requirements.

5. A stand-by emergency generator set was provided to supply adequate anti-panic lighting in the event of a power failure.

Broadcasting and Communications

This section will be divided into three (3) general categories: (a) Public Address System, (b) Inter-Communication System, (c) Public Telephone System.

(a) Public Address System

1. A public address broadcasting system for both speech and music has been designed for the Assembly and Exhibit Halls. This system was integrated with the acoustical engineering. The broadcasting system extends into secondary meeting and conference rooms. The public address system is designed to provide audience participation so that speaking may be done from various parts of the audience floor.

2. Provisions were made to permit public broadcasts over radio and television. This is arranged so that broadcasts may originate in the main Assembly and Exhibit Halls as well as in fully equipped sound proof broadcasting rooms.

3. Provisions have been made to permit closed circuit radio and television broadcasts within the building in the future.

4. Provisions have been made to permit closed circuit broadcasting and receiving of radio and television between Las Vegas and other parts of the United States.

5. Two-way control was provided from a control center possibly near building entrance for direct two-way communication, announcements, etcetera.

6. Provision is made for moving picture projection within the Assembly Hall.

(b) Intercommunication System

An intercommunication system is provided using a private house telephone system. This system provides private communication between private booths, offices, meeting rooms, etcetera.

Air-conditioning and Heating

1. All areas except storage rooms, miscellaneous closets and toilet rooms are air-conditioned using mechanical refrigeration. All areas not air-conditioned are adequately ventilated and exhausted.

2. Space was provided to house major items of mechanical equipment such as cooling tower, compressors, motors, chillers, condenser pumps, boiler, etcetera, with reasonable allowance for expansion.

3. A gas fired boiler was provided for production of steam to heating coils.

4. A separate cooling and heating system is provided for main Assembly Hall.

5. A separate cooling and heating system is provided for the main Exhibit Hall.

6. Individual package air-conditioning units are provided for meeting and conference rooms so that the main system will not require operation when only the meeting and conference rooms are in use.

7. Provision was made in all equipment areas for reasonable expansion.

8. Generally, the Assembly Hall system provides mixing units and controls in the attic space with distribution through ducts from above the Assembly Hall ceiling.

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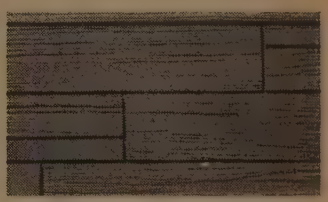

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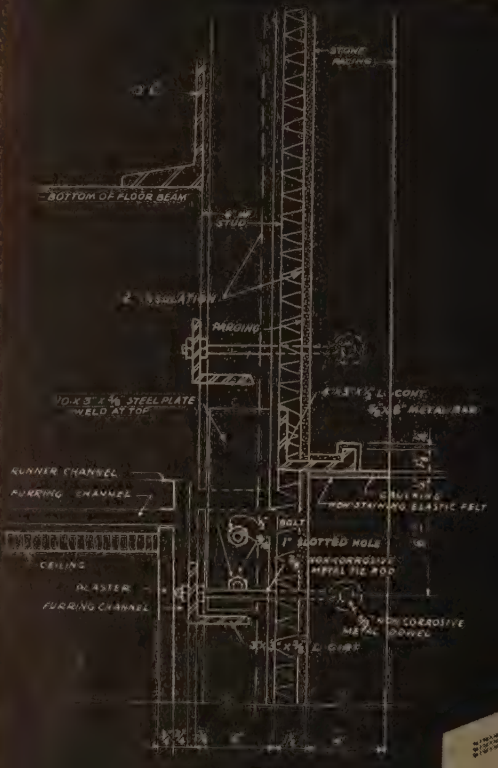

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ENTRANCE AREAS

Architect: Richard L. Dorman, Tile Contractor: Selectile. Plate No. 605

THE MOSAIC TILE COMPANY — CERAMIC TILE ENTRANCE AREAS — A.I.A. FILE NO. 23-A

Mosaic Ceramic Tile

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Because the entrance is usually the heaviest traffic point in a building, permanence of materials and ease of maintenance are basic requirements.

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The Mosaic Tile Workbook for Architects, Form No. 226, is in Sweet's. For additional data, write The Mosaic Tile Company, Dept. A, Zanesville, Ohio, or The Mosaic Tile Company, Dept. A, 829 N. Highland Ave., Hollywood 38, California.

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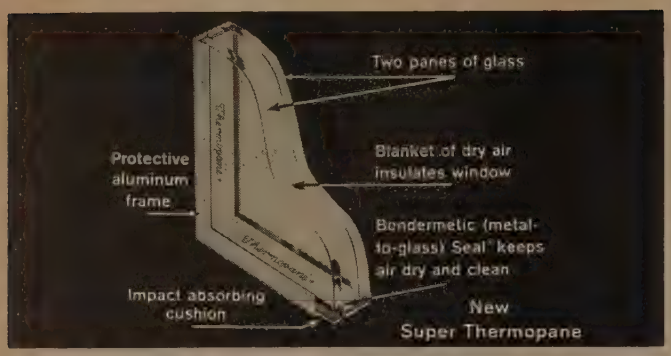
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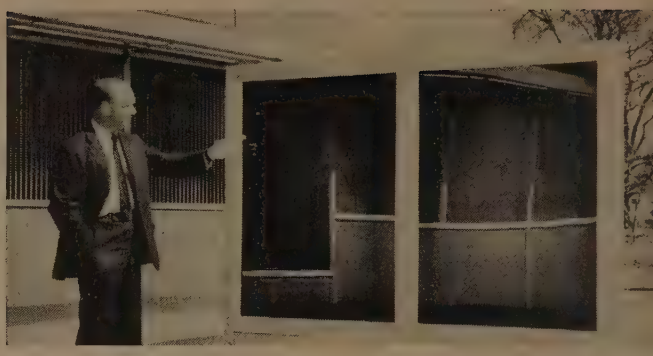

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This floor is Congoleum-Nairn Nairon® Custom vinyl plastic tile in the exclusive Venetian* pattern—the one that looks like fine marble. And every day it defies all the forms of abuse listed.

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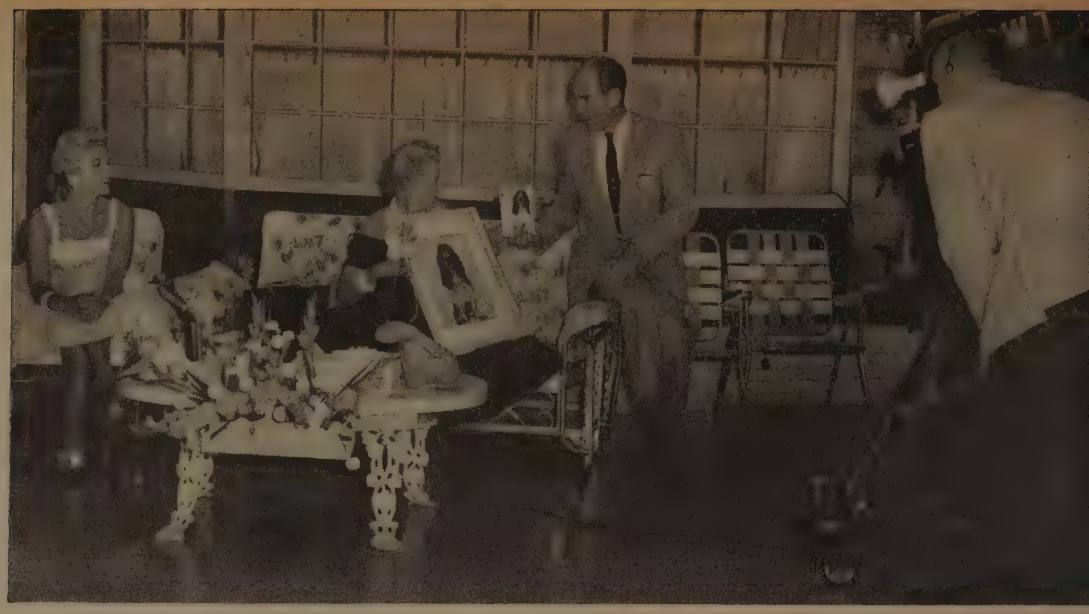

WLW'S ⅛" Sequin floor on camera for the Ruth Lyons Show at 11:00 A.M.

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Still taking the punishment at 9:00 P.M., the same floor shines on Barn Dance Jubilee.

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Congoleum-Nairn offers you a whole family of inlaid linoleum and resilient tile flooring material†—each with its own special uses and advantages. All are designed to please the most exacting client.

SPECIFICATIONS: ⅛" "Sequin" linoleum 6′ wide yard goods, 9" x 9" tile⅛" gauge, burlap-backed. Install over suspended wood or suspended concrete subfloors (even over radiant heat). Available in: grey, green, dark brown, white multi, grey mix, taupe, beige, and white with black. Also made in standard gauge for residential use.

GOLD SEAL CONGOLEUM-NAIRN INC.

Congoleum-Nairn FINE FLOORS

Congoleum-Nairn Inc., Kearny, N. J.

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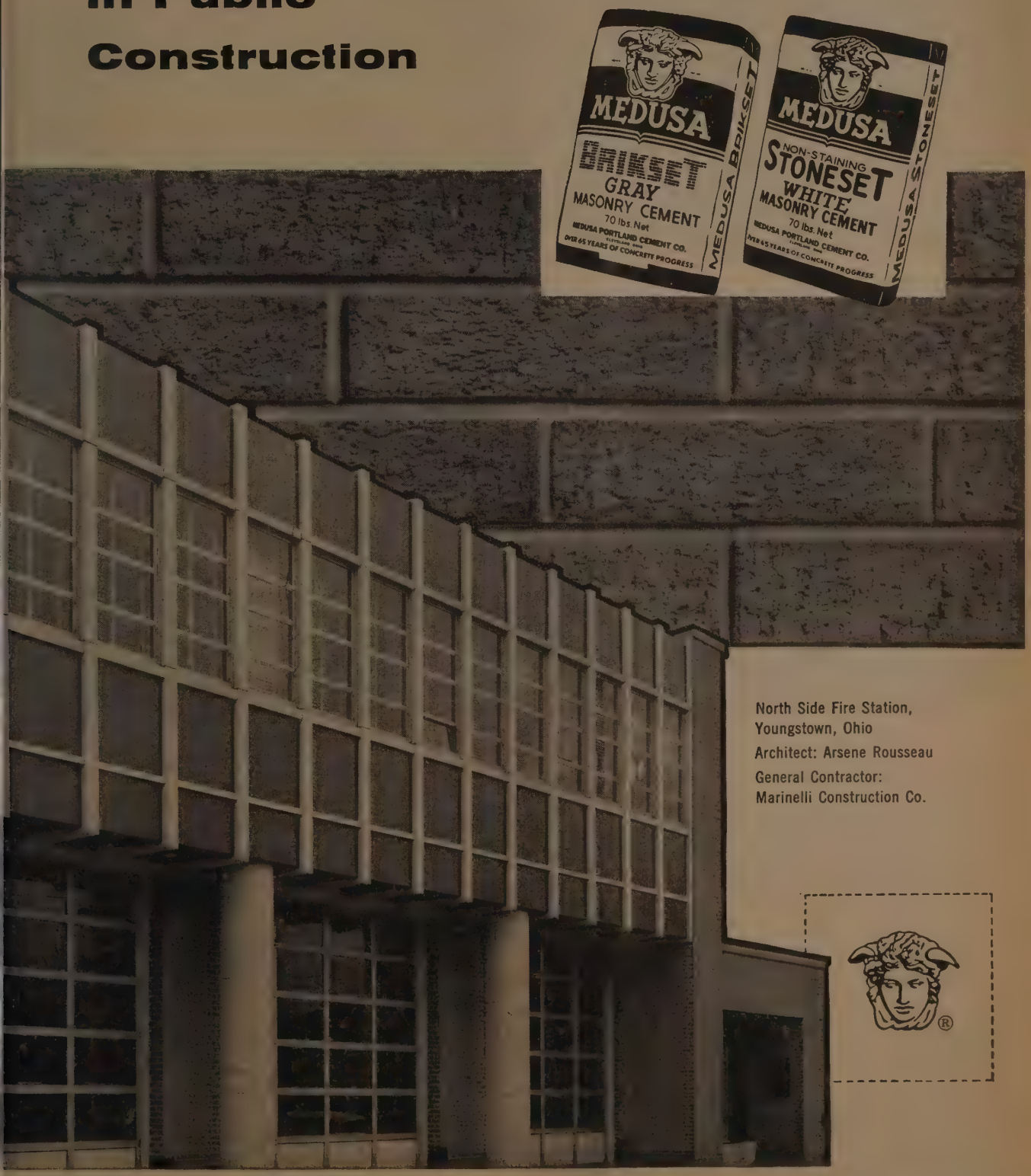
THE IMPORTANT LINK

Between Masonry Units in Public Construction



North Side Fire Station,
Youngstown, Ohio
Architect: Arsene Rousseau
General Contractor:
Marinelli Construction Co.

See following page →

MEDUSA BRIKSET AND STONESET

FIRST CHOICE OF PUBLIC BUILDING ARCHITECTS . . .

Bixby Hospital, Adrian, Michigan
Architect: L. Sarvis
General Contractor: Jeffress-Dyer, Inc.

Oshawa Police Department, Oshawa, Ontario
Architect: Hanks, Irwin & Tonks

Rochelle High School, Rochelle, Illinois
Architect: Foley Hackler Thompson & Lee
General Contractor: Ragnar-Benson Co.

• Those important masonry walls in your public buildings can be no better than the mortar you use to link the units together. Medusa BrikseT and StoneseT Masonry Cements—proved through almost 30 years of climate-exposure in all types of buildings—are today's answer to your demand for dependable, good looking mortar. Specify economical BrikseT where uniformly gray mortar joints are required. Use luxurious StoneseT for beautiful white or tinted mortar joints.

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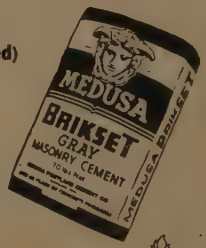
MEDUSA BRIKSET (gray masonry cement)
MEDUSA STONESET (white masonry cement)
MEDUSA WHITE TILE GROUT CEMENT
MEDUSA WHITE DRY WALL TILE GROUT CEMENT
MEDUSA WATERPROOFING PASTE AND POWDER



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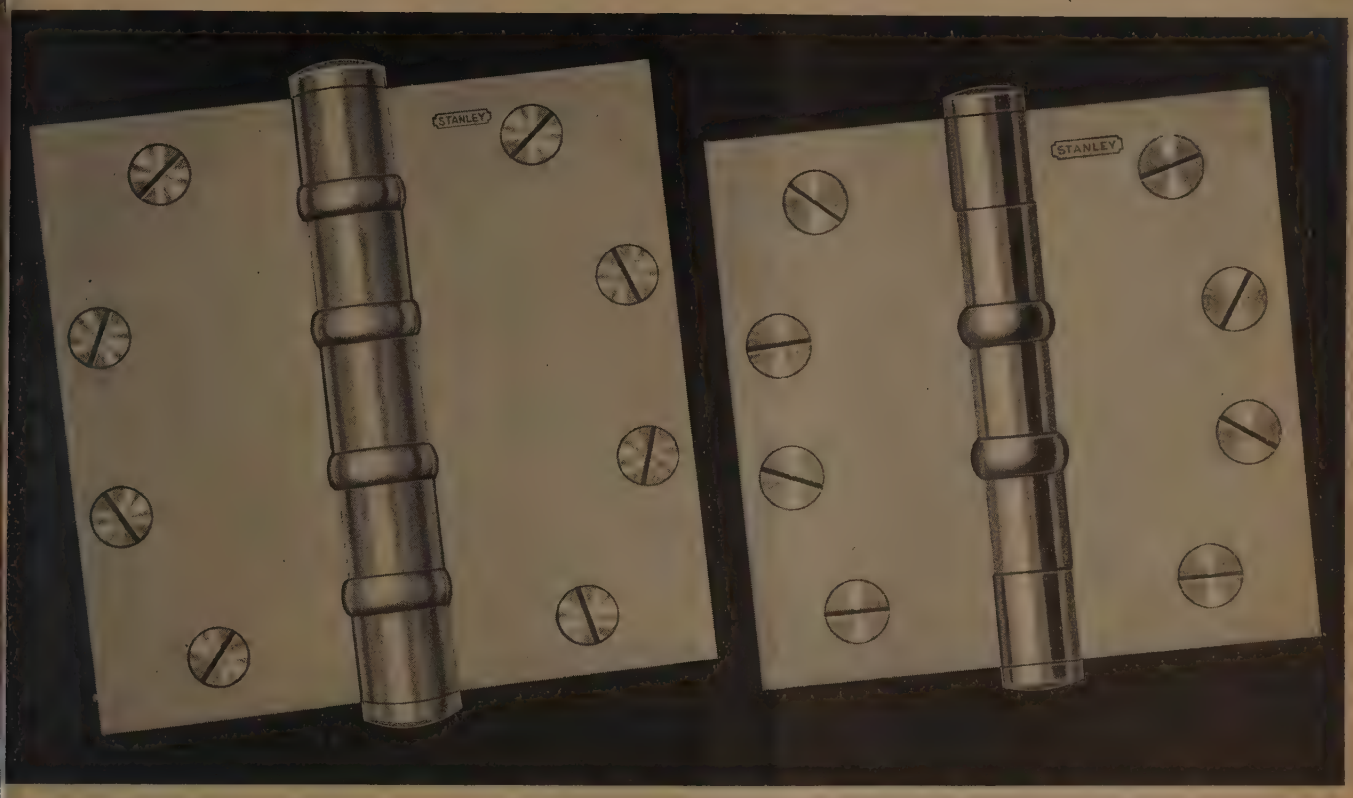
FOR OFFICE BUILDINGS . . .

Stanley ball bearing hinges



STANLEY BB199 full-jeweled, ball bearing hinge for heavy doors or doors expecting high-frequency service.

STANLEY BB193 ball bearing hinge for medium-weight doors receiving average-frequency service.

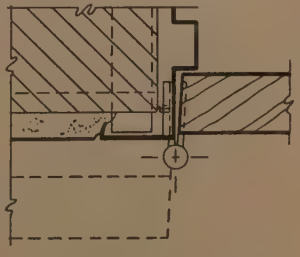
1. ***Weight of door and frequency of use.*** The ball bearing hinge was introduced by Stanley to eliminate vertical wear in hinge joints. The full-jeweled, ball bearing hinge, a patented Stanley development for heavy or high-frequency doors, also eliminates lateral wear.

   Stanley offers you a complete range of hinges to meet all possible requirements of weight and frequency. They're permanently lubricated, need no further attention.

   Under-hinging is costly and unnecessary. Insist on the proper Stanley hinges to swing your doors for the life of your building.

2. ***Exterior and interior locations.*** Only non-ferrous metals give absolute assurance against rust. Brass or bronze hinges are recommended for exterior doors.

3. ***Material of door and frame.*** Hinges are *mortised* into wood, hollow metal and composite doors and into wood and pressed metal frames. Hinges are *surface-applied* to materials that do not permit mortising. Stanley gives you a complete selection of full-mortise, full-surface, half-mortise or half-surface hinges.



Wood door with pressed steel frame — typical situation calling for a full-mortise hinge.

Consult your Stanley catalog for full details. Stanley Hardware, Division of The Stanley Works, New Britain, Conn.

See other side for information on Stanley's smart olive-knuckle hinges.

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STANLEY

This famous trademark distinguishes over 20,000 quality products of The Stanley Works—hand and electric tools • builders and industrial hardware • drapery hardware • door controls • aluminum windows • stampings • springs • coatings • strip steel • steel strapping—made in 24 plants in the United States, Canada, England and Germany.

THE OLIVE-KNUCKLE HINGE . . .

stylish, sturdy, STANLEY

Extra-heavy ball bearing hinges (shown at right) are designed for hollow metal doors, heavy wood doors, doors receiving high-frequency service, or doors equipped with door closers.

Regular weight, ball bearing hinges are made for wood doors with wood or pressed steel jambs in residences and apartment houses: 5″ hinges for 1⅜″ doors, 6″ hinges for 1¾″ doors. Smaller 3½″ olive-knuckle hinges swing cabinet doors.

A mark of distinction on the hinge side of the door.

When door is closed, only the knuckle is visible.

The olive-knuckle hinge adds just the right touch to surroundings designed to create an impressive, luxurious atmosphere. Its permanently lubricated ball bearings enable the hinge to carry far heavier loads than is suggested by its graceful appearance.

Send for details today. Consider this hinge for your next prestige building.

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This famous trademark distinguishes over 20,000 quality products of The Stanley Works—hand and electric tools • builders and industrial hardware • drapery hardware • door controls • aluminum windows • stampings • springs • coatings • strip steel • steel strapping—made in 24 plants in the United States, Canada, England and Germany.

U.S. Naval Academy Field House.
Architects: Harbeson, Hough, Livingston & Larson, Philadelphia, and Von Storch, Evans, & Burkavage, Philadelphia

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when Natco building products are in the picture

Architects of the new United States Naval Academy Field House have employed a unique combination of bas relief and a blended pattern of Natco Speckled Ceramic Glaze Face Brick to complement the exterior design features of the structure. "Annapolis Blend," as this tri-shaded brickwork mix is known today, was developed through close cooperation of the architects and Natco's sales representative.

Another Natco product, Ceramic Glaze Facing Tile, was used to enhance various interior locations. Natco Vitritile provides both structural qualities and an attractive finished facing in a single unit.

In all, more than 40 basic structural clay products, manufactured under careful quality control, are available from Natco to meet every building requirement, every architectural need. Write for Natco's general catalog S559.

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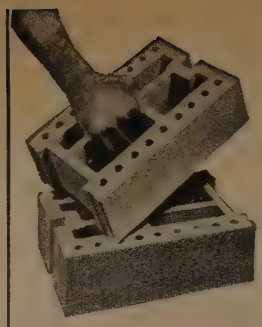
NATCO QUALITY CLAY PRODUCTS SINCE 1889

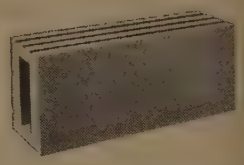
Always look to NATCO for the complete line of structural products for quality masonry construction



NATCO Uniwall Facing Tile

For single unit wall construction finished inside and out. Manufactured from hard burned, deaired fire clay to conform to all A. S. T. M. and Federal specification requirements for load-bearing and structural facing tile. Small number of shapes required for finished exterior walls and partitions offer sizable construction economies.

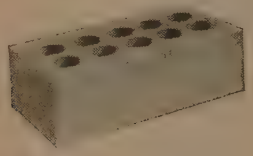
Tile Face Size 3⅝" x 11⅝" Buff Range Rugg-Tex Exterior Finish—Ceramic Glaze Interior Finish.



NATCO Ceramic Glaze Vitritile

Furnished in nominal 2", 4", 6" and 8" wall thicknesses in ceramic color, speckled and clear glaze finishes. Vitritile makes colorful, permanent interiors possible yet requires little maintenance. Complete shapes and fittings furnished for all construction requirements.

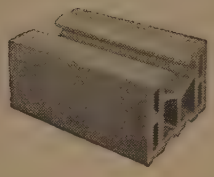
Furnished in 22 standard colors including the new speckled glaze finish. Nominal face sizes: "8W" Series 8" x 16", "6T" Series 5⅓" x 12", "4D" Series 5⅓" x 8". Write for shape catalogs.



NATCO Ceramic Glaze Velour Brick

Manufactured from highest quality fire clays, Natco Ceramic Glaze Velour Brick is perfect for the interiors and exteriors of modern buildings, homes and apartments.

It is furnished in nine attractive colors plus black and white and in standard brick sizes.



NATCO Dri-Speedwall Tile

Highly impervious to moisture—fire, termite and vermin-proof. Easily handled exterior units for complete load-bearing nominal 8" wall construction or multiple unit walls of other thicknesses utilizing 2", 4" and 6" stretchers and standard fittings.

Full stretcher units, nominal size—8" x 5⅓" x 12". Colors: Buff Unglazed, Manganese Spot, Salt Glaze and Red Textured.

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Ceramic Glaze Vitritile "8W," "6T" & "4D" Series	Clay Drain Tile
	Clay Sewer Pipe
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Write for General Catalogs S-58 and SB-58

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Norman Roman SCR Standard

A complete line of facing brick, including ceramic glaze finishes, is manufactured by Natco, in distinctive red, buff and gray ranges. The nominal 12" length of Norman, Roman and SCR bricks are preferred where strong horizontal lines are desired . . . larger sizes promote economies in labor during erection.

TABLE OF BRICK SIZES, INCHES

	Height	Depth	Length
Norman	2⅛	3½	11½*
	2¼	3⅝	11⅝†
SCR	2⅛	5½	11½**
Roman	1⅝	3⅝	11⅝‡
Standard	2¼	3¾	8‡

*Red †Buff and Gray ‡Red, Buff and Gray
**Red and Buff

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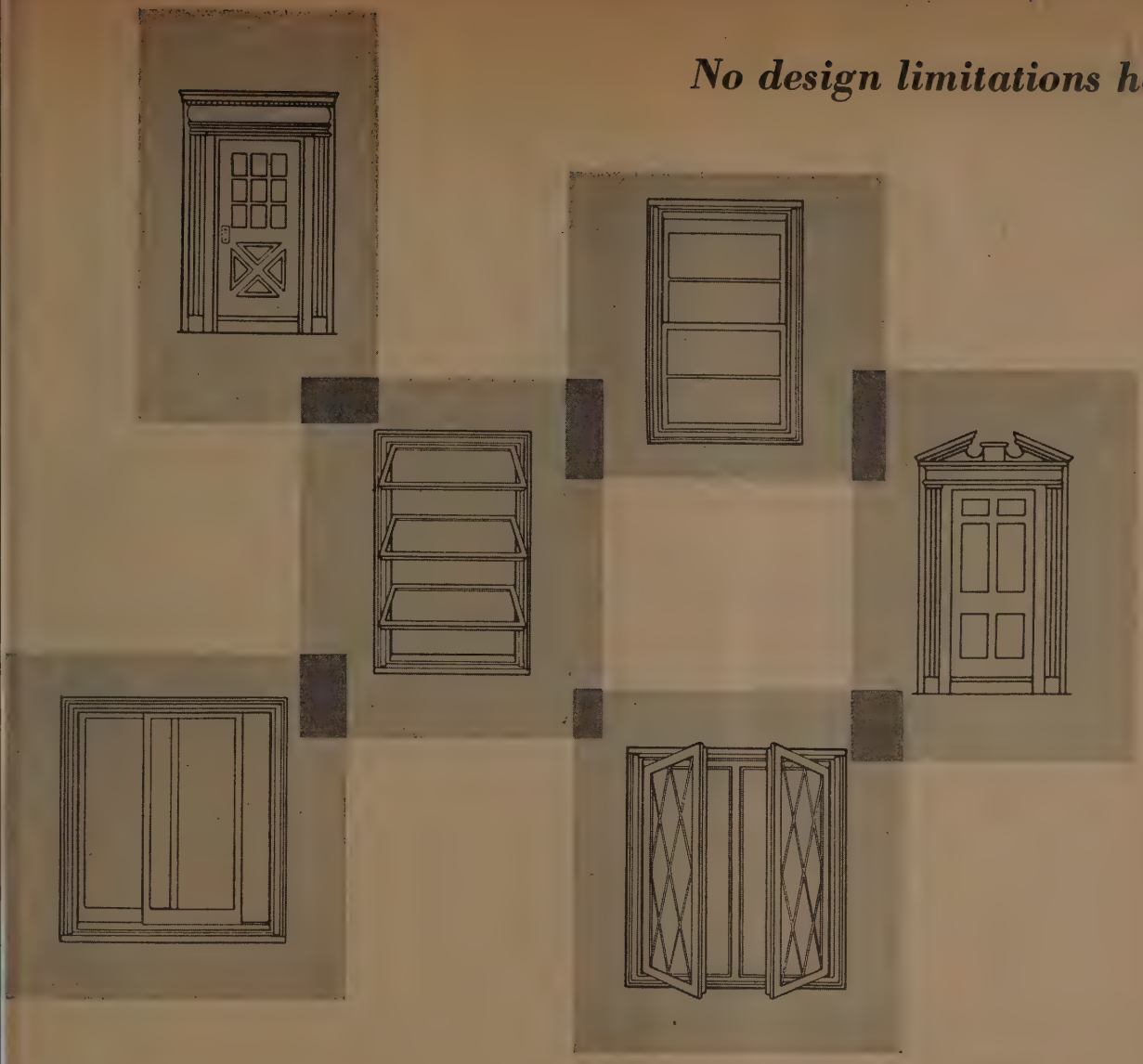

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Freedom in creative design can work virtually unhampered among the almost endless range of sizes and styles in beautiful windows and doors available from a host of manufacturers. But aside from esthetic considerations the practical factor of weathertightness is also of paramount importance.

There is only one way to be sure of getting a completely harmonious integration of satisfying appearance and dependable weather protection, as well as easy operation and freedom from maintenance: Insist that both windows and weatherstrip be designed together and made for each other.

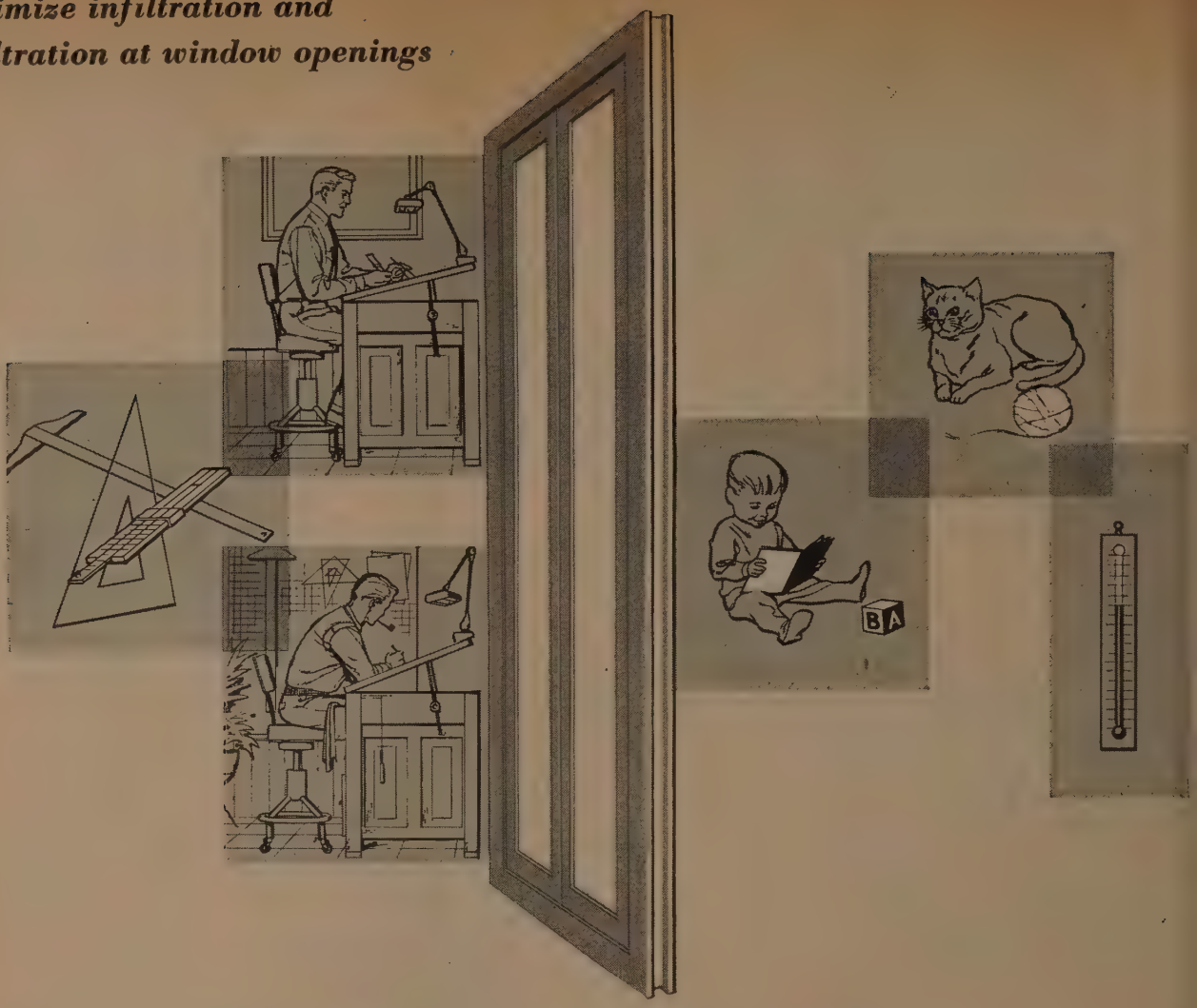
These "compatibly-engineered" and precision-built windows or doors, and Monarch weatherstrip always conform to, or exceed, the high commercial standards of the Department of Commerce, and the several national window manufacturer associations. To give your clients window beauty, finer construction and the greatest possible protection against the weather, *specify Complete Window Units equipped with Monarch Metal Weatherstrip.*

MONARCH METAL WEATHERSTRIP

World's Largest Exclusive Weatherstrip Manufacturer

6349 ETZEL AVE. • ST. LOUIS 14, MO.

Minimize infiltration and exfiltration at window openings



Assure your clients uniform year 'round comfort with compatibly-engineered window units and Monarch Weatherstrip

The efficiency of operating windows differs widely in controlling heating and cooling costs. To achieve the highest degree of weather-tightness, weatherstrip and windows must be designed and precision-made for each other.

"Compatible-engineering" has always been standard procedure between Monarch and window manufacturers. It is the only *right* method to assure owners maximum economy in heating and cooling, minimum cost for cleaning and maintenance, and uniformly comfortable temperatures every season of the year.

Specify Complete Window Units equipped with Monarch Metal Weatherstrip to give your clients the finest protection available. Monarch weatherstrip on windows and doors is recognized as a seal of superior quality.

MONARCH METAL WEATHERSTRIP

World's Largest Exclusive Weatherstrip Manufacturer

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A continuing series of outstanding schools, churches, office buildings, hospitals and industrial structures using NORTON DOOR CLOSERS

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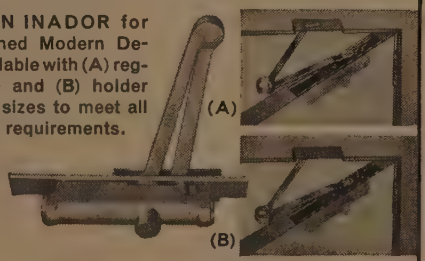
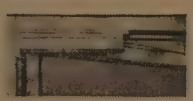
BURNS & McDONNELL ENGINEERING CO., ARCHITECTS AND ENGINEERS • AMMANN & WHITNEY, CONSULTING STRUCTURAL ENGINEERS

Complete Norton Line Meets Every Door Closer Need

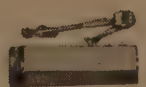
NORTON INADOR for Streamlined Modern Design available with (A) regular arm and (B) holder arm...4 sizes to meet all standard requirements.





NORTON 750: New corner design with concealed arms for all type doors, particularly narrow rail doors.

Norton Surface-type Closers are available for all installations where concealment is not essential.



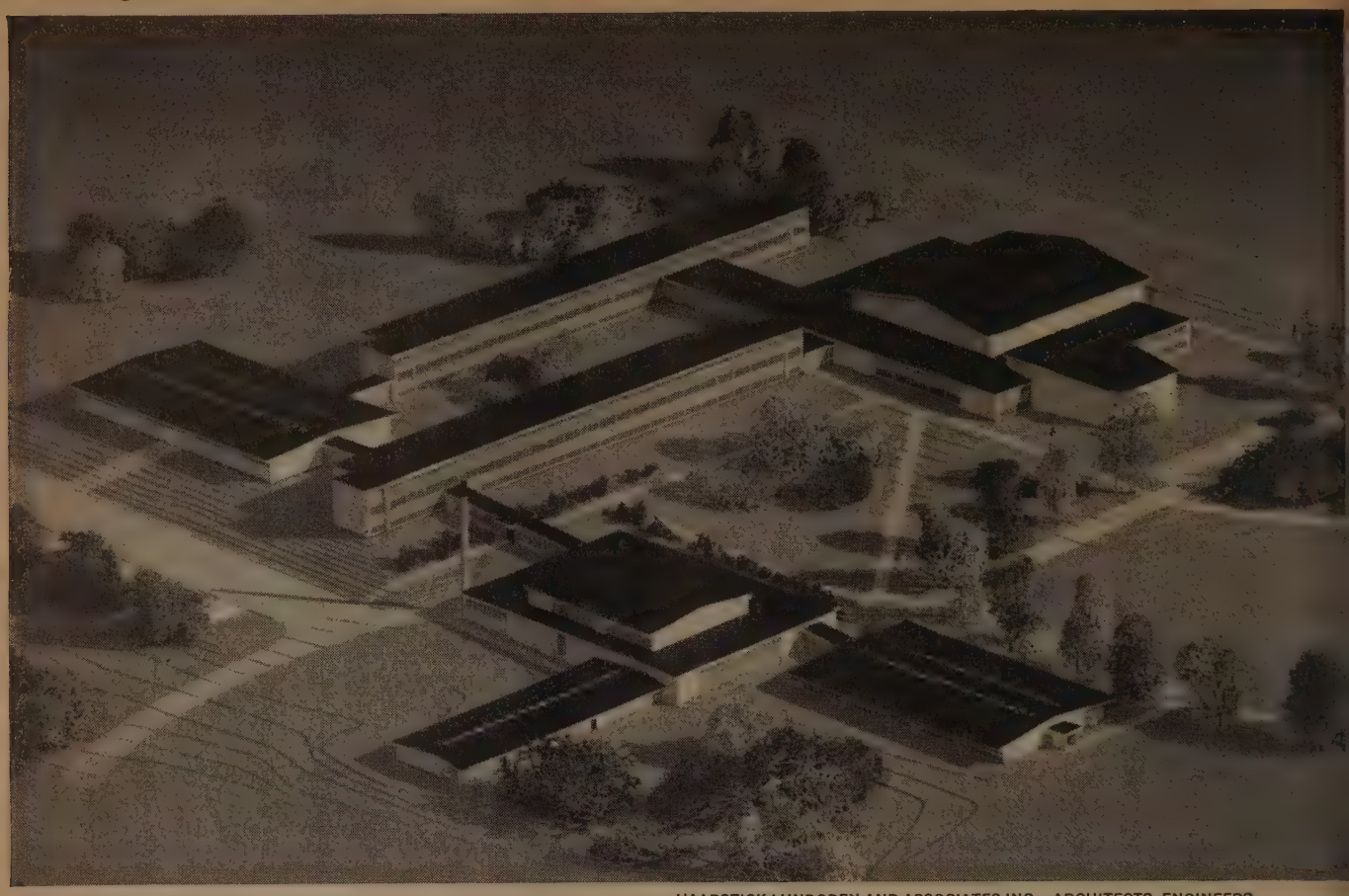
NORTON 703E: Compact surface mounted type...first closer with extruded aluminum alloy shell.

An engine for an airliner or a door closer for the plant which overhauls that engine, both must have one quality in common—dependability—to be acceptable to Trans World Airlines. With that thought in mind, the engineers specified *Norton Surface-Mounted Door Closers* for buildings at Trans World Airlines' new $18,750,000 overhaul base on Kansas City's Mid-Continent International Airport.

The door closers used here by TWA are the modern counterparts of Norton Door Closers still in daily use after serving continuously 20 to 30 years and longer. Other Norton models are available as shown at the left, to serve virtually every door closer need with equal dependability. See the new Norton catalog #57 for full descriptions of the complete line, including important new models. Write for it today.

NORTON® DOOR CLOSERS

PC-128



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SCHOOL PLANNING THAT LOOKS AHEAD SPECIFIES NORTON DOOR CLOSERS

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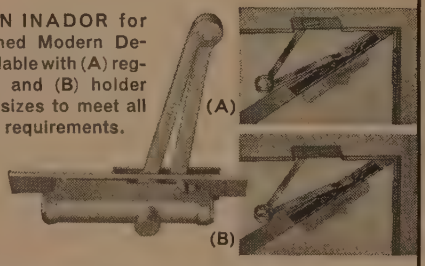
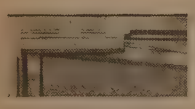
Complete Norton Line Meets Every Door Closer Need

NORTON INADOR for Streamlined Modern Design available with (A) regular arm and (B) holder arm...4 sizes to meet all standard requirements.





NORTON 750: New corner design with concealed arms for all type doors, particularly narrow rail doors.

Norton Surface-type Closers are available for all installations where concealment is not essential.

NORTON 703E: Compact surface mounted type...first closer with extruded aluminum alloy shell.

Here's an outstanding new school building—the result of plans that were made to meet some twenty carefully considered objectives. Among them: (1) The building must be functional; modern beauty without waste. (2) It must be of good materials to stand the test of time. These two factors governed selection of door closers.

Interior doors have NORTON INADOR Closers mortised into the top rail. Their compact, fully concealed mechanism packs all the rugged dependable power of true liquid-type closers plus the reliability, low maintenance and precision workmanship common to all *Norton Door Closers*.

Exterior doors use Norton Surface-Mounted Closers, modern counterparts of Norton Closers still in daily use after serving continuously up to 30 years and longer in some of America's most famous public buildings. For fully illustrated data on these and other models, consult the current Norton Catalog. Write for it today.

NORTON® DOOR CLOSERS

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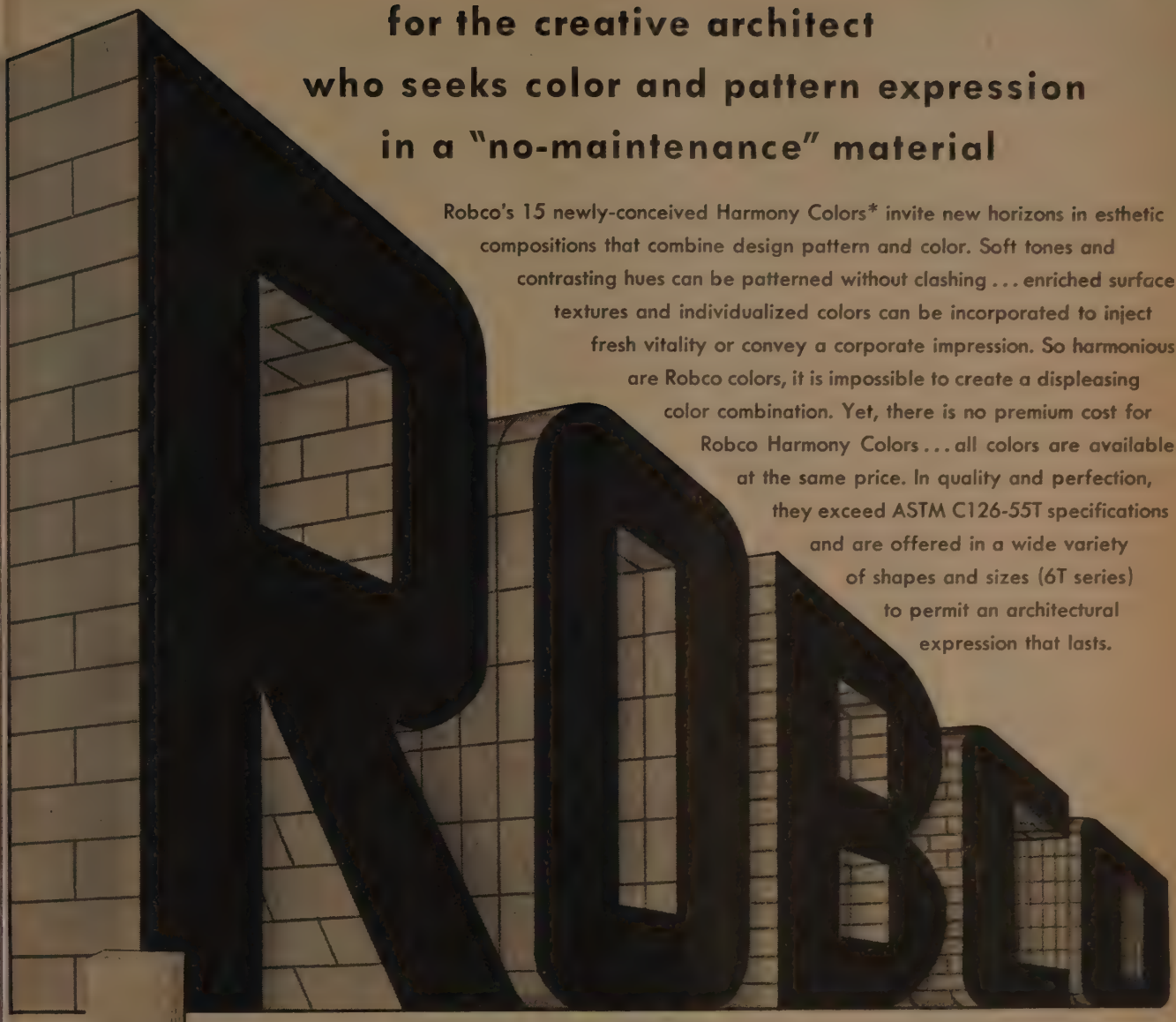
for the creative architect who seeks color and pattern expression in a "no-maintenance" material



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STRUCTURAL GLAZED FACING TILE

*Robco's new color concept that uses color and patterns as systematically as the chords on a piano keyboard.

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STRUCTURAL GLAZED FACING TILE
IN 15 NEW HARMONY COLORS

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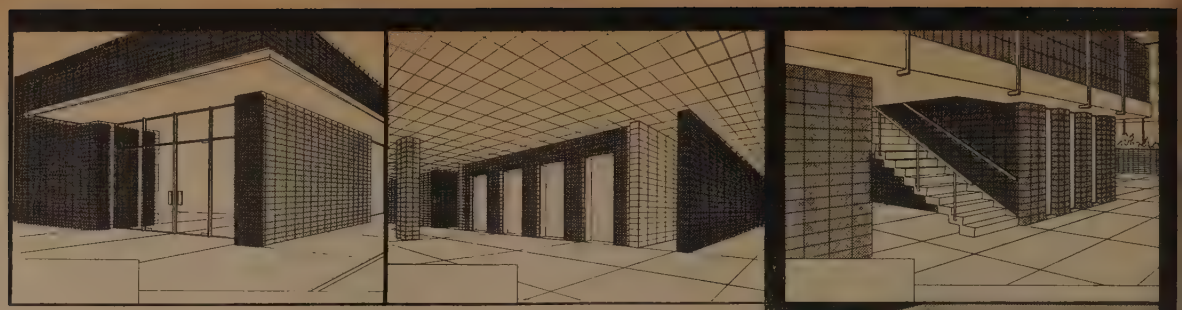

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Please send me:

- ☐ Robco's "Architects Handbook" illustrating inspiring color and pattern designs in Structural Glazed Tile.
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distinguished designers series

With bold and sure strokes, famed watercolorist Dong Kingman fashioned the sixth dramatically different design for Pomona Tile's "Distinguished Designer Series." Appropriately named "Fishnet" by the artist, this enchantingly Oriental creation subtly reflects Mr. Kingman's Hong Kong origins and training. Wherever flavor of the Far East is dominant, in commercial or residential construction, "Fishnet" ceramic tiles blend into the overall plans. Available in 4¼ x 4¼ modules; in satin or Perma-Glaze finish. See "Fishnet" at your nearest tile contractor or any of Pomona's showrooms.

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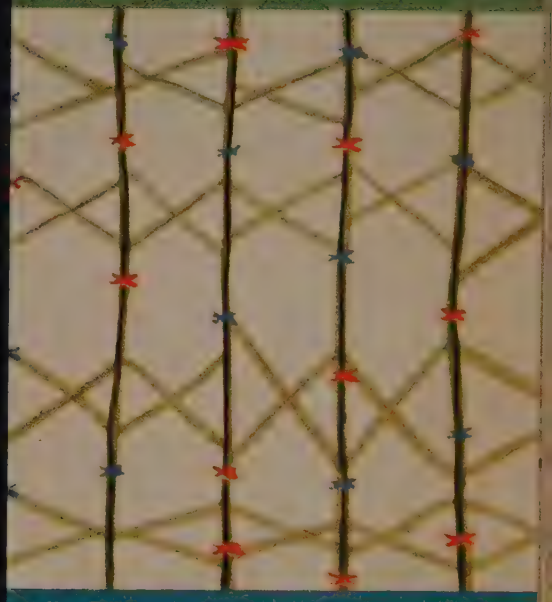
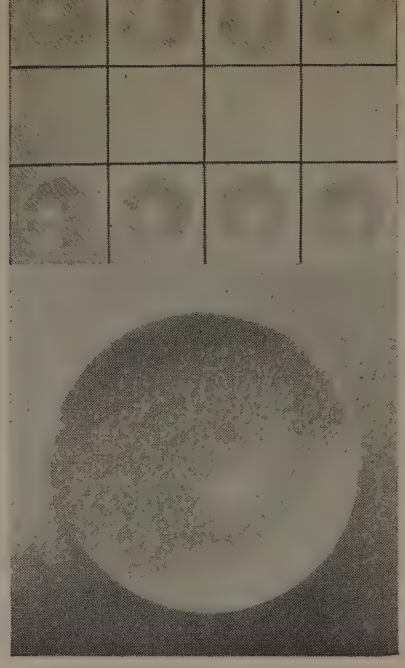
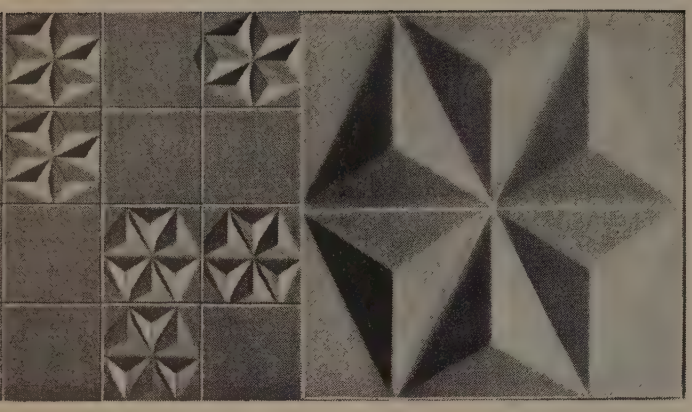
"FISHNET" . . . by DONG KINGMAN



"SPHERE"



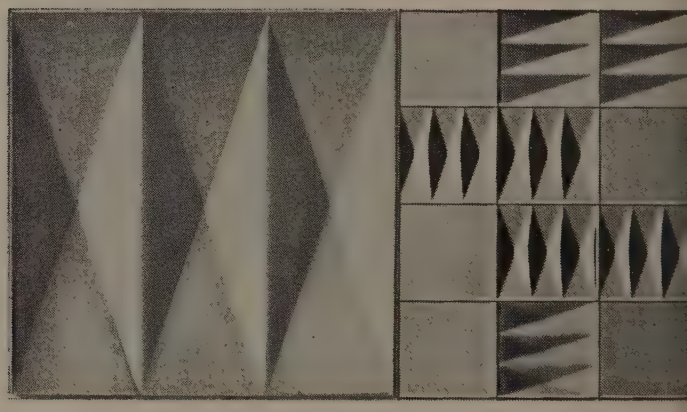
"STAR"



POMONA'S NEW, 3-DIMENSIONAL

"Sculptured Tile"

"DIAMOND"



The first *really* new idea in tile design for many decades... Pomona's "Sculptured Tile" has stirred the imagination of architects, builders and home owners.

Famed designer Saul Bass, one of five artists and designers commissioned by Pomona Tile for the Distinguished Designer Series, developed three basic forms of "Sculptured Tile"... "Sphere"... "Star"... and "Diamond." Though the rich texture gives the impression of an expensive installation, "Sculptured Tile" is surprisingly modest in price... actually costs less than many other decorative tiles.

All three designs are available in Pomona s complete range of colors, in three different surface finishes—bright, satin and Perma-glaze. Size: 4¼x4¼.

Ask your Pomona Tile representative for samples or see them at your nearby Pomona Tile Showroom.

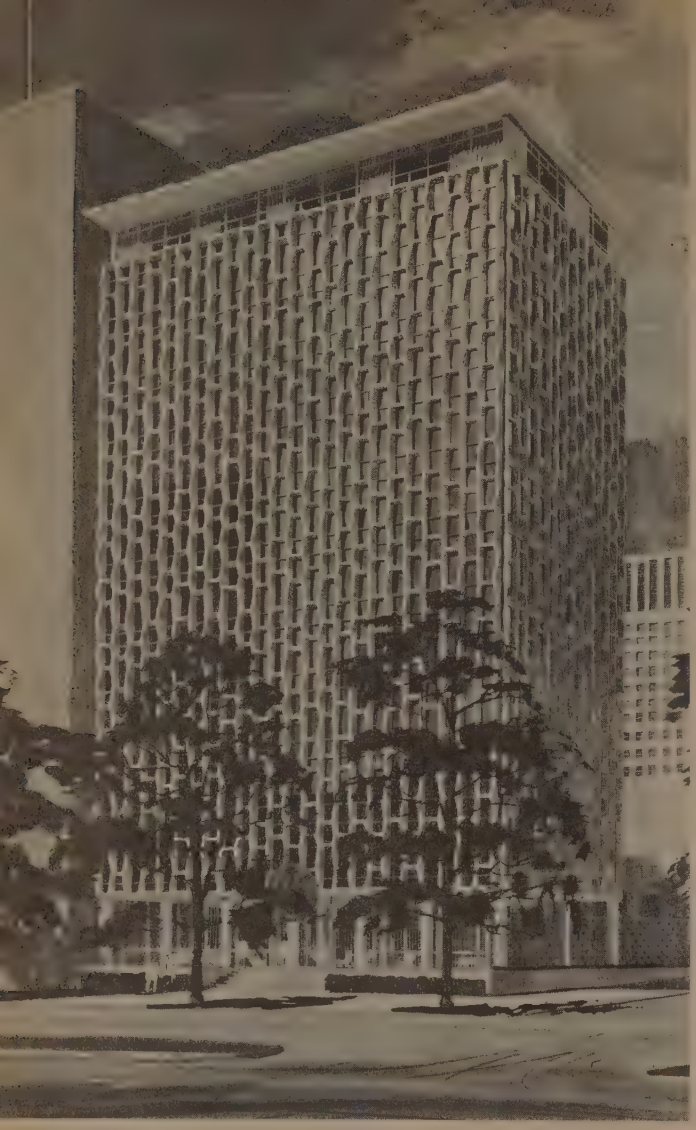
POMONA TILE

POMONA TILE
Manufacturing Company,
Los Angeles 38, California

Branch offices in: Seattle, Sacramento, San Francisco, Salt Lake City, Pomona, Colton, North Hollywood, Long Beach, Phoenix, Denver, Dallas, Fort Worth, Wichita, Oklahoma City, Kansas City, St. Louis, Chicago, Detroit, Arkansas City, Memphis, Nashville

ARCHITECTURAL PHOTO STUDY

public building construction



U. S. MISSION TO THE UNITED NATIONS BUILDING

New York, N. Y.

Associate Architects: **KELLY & GRUZEN**
KAHN & JACOBS

Structural Engineers: **HARWOOD & GOULD**

Mechanical Engineers: **SLOCUM & FULLER**

The structure, which will be the only U. S. Embassy office building within the Continental United States, will be composed of three basic elements—a 12-story (and basement) office wing; a service core adjoining the office wing; and a 2-story (and basement) auditorium wing, separated from the office wing by an enclosed courtyard.

The facade of the office wing will feature a screen of cast stone in cream white, forming a series of hexagonal frames for the glass curtain wall. The 14" overhang of the stone screen was introduced to provide natural light and sun control, since the entire building is air-conditioned with floor to ceiling glass on all floors. Pivoting sash windows facilitate cleaning.

Construction is steel frame with steel and concrete floors. The service core will be enclosed with light gray-buff brick masonry, and the auditorium with masonry, repeating the pattern of the cast stone screen on the office wing. Main entrance to the office wing features free standing stone faced columns on which the building will rest. An auditorium, seating up to 250 guests, adjoins the courtyard.

The separation of the office wing from the service core was devised as a means of direct access to each floor; for efficient and rapid coordination of the various departments; and to allow more flexibility in the office layout.

The project, which is under the direction of the General Services Administration, Public Building Service, has an appropriation of $3,750,000.

CANTON CITY HALL

Canton, Ohio

Architects: **KELLY & GRUZEN**

Associated Architects: **COX & FORSYTHE**

Structural Engineers: **WEINBERGER, FREEMAN, LEICHTMAN & QUINN**

Mechanical Engineers: **MUZZILLIO & TIZIAN**

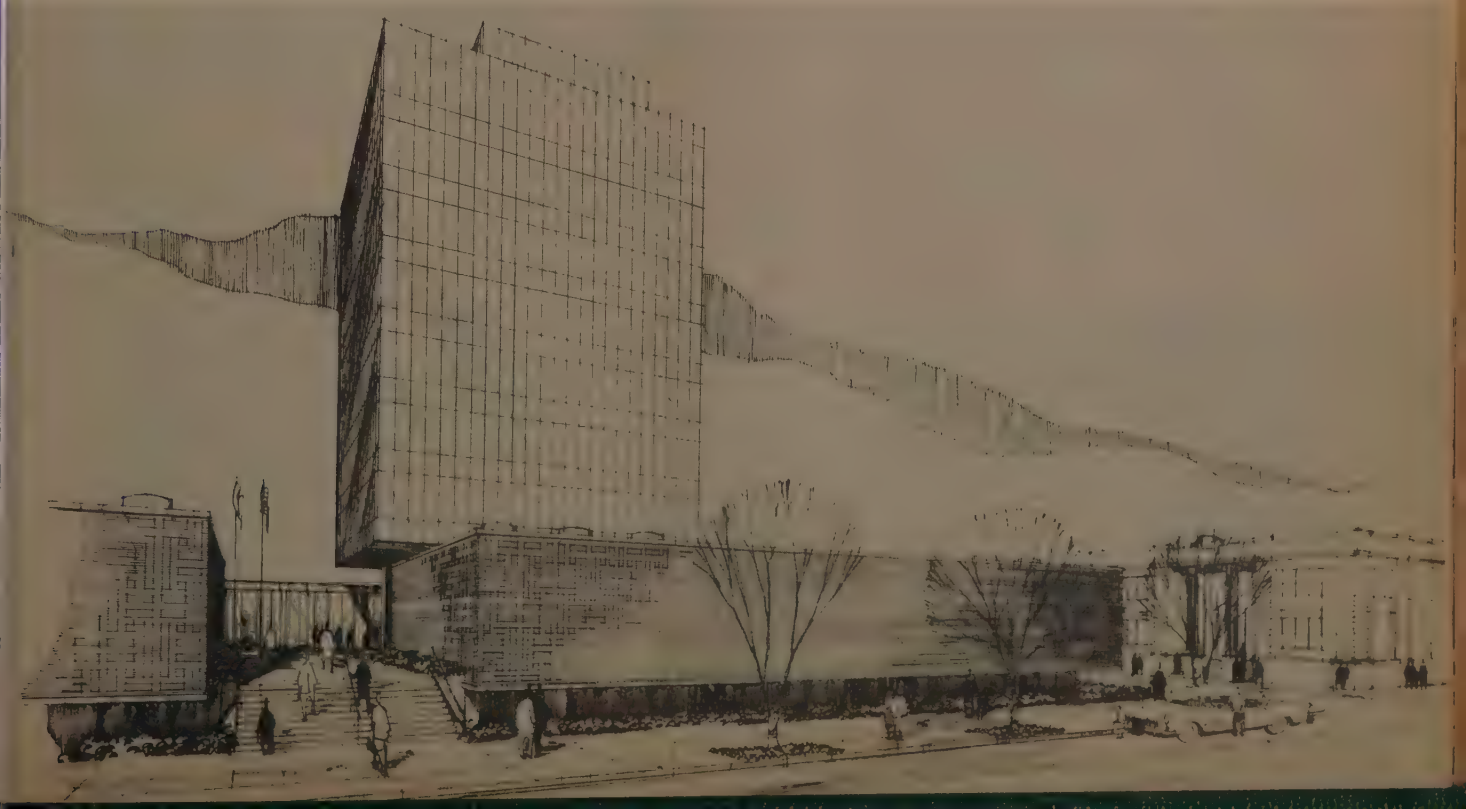
Built on the site of the old City Hall, the structure will occupy the entire 200x200 foot block. Focal point will be a seven-story office tower on columns arising above a plaza level on which will be located all City facilities requiring public assembly. Remaining space on the first floor or plaza level will be devoted to lobbies, gardens, patios; and a Memorial Courtyard to be paved with the brick of the demolished building. The plaza level will be enclosed by a brick patterned wall.

The arrangement of the plaza creates a distinct civic atmosphere, planned with particular regard for public circulation and uses of the structure. Separation of the office tower from the courts and police facilities was introduced to provide a direct means of access to each floor and for the most efficient coordination of the various municipal departments. Location of the courts on the ground floor will accommodate public traffic without interference with office areas.

Location of the police and jail on the first floor, 3′ below grade, was established for security control and to keep police traffic away from other activities of the City Hall. The basement floor will contain a Civil Defense Training Area and Control Center, as well as power plant for the structure.

Office tower construction will include structural steel, concrete floors, glass curtain wall utilizing colored glass for light control. It will be fully air-conditioned.

Estimated construction cost is $2,965,000. Approximate number of square feet is 150,000.



CITY HALL BUILDING

Passaic, New Jersey

Architects: **KELLY & GRUZEN**

The new City Hall building is one segment of an integrated civic center, which also includes a senior high school and the Forstman Library. Design is contemporary to harmonize with the high school and library. The building has 2½ stories and a partial basement. Construction is of reinforced concrete with brick veneer.

A civic plaza unites the City Hall with the high school and provides a common point of entrance to both units. Half the ground floor level of the City Hall is open, creating a covered terrace which serves as the principal entrance from Passaic Avenue.

HEADQUARTERS OFFICE BUILDING, BUREAU OF OLD AGE SURVIVORS INSURANCE

Baltimore, Maryland

Associated Architects: **MEYER & AYERS**
FISHER, NES, CAMPBELL & ASSOCIATES
Structural Engineer: **VAN RENSSELAER P. SAXE**
Mechanical-Electrical Engineers: **WHITMAN, REQUARDT & ASSOCIATES**
Landscape Architects: **CLARKE & RAPUANO**
General Contractor: **McCLOSKEY & COMPANY**

Situated on 81 acres of land, the building contains 1,350,000 sq. ft. and was built at a cost of $22,060,554 or $16.34 per sq. ft.

The Operations Building structural frame is reinforced concrete, flat slab, with columns 25 feet on center each way. The Administration Building structural frame is reinforced concrete, one way slabs, with columns on the lower floor reinforced with steel cores. Exterior facing material is glazed brick with polished granite trim. Building contains 12 elevators and 4 escalators.

A unique feature of the building is an installation, comprising 20,000 sq. ft., of three electronic data processing machines. This installation is on a specially designed floor of removable panels to permit original installation and future alteration of coaxial cable between electronic machines. The building also contains 750,000 sq. ft. of cellular steel subfloor for the installation of numerous items of I.B.M. equipment.

ADMINISTRATION BUILDING
NATIONAL INSTITUTES OF HEALTH

Bethesda, Maryland

Architects: **KEYES, LETHBRIDGE & CONDON**
RICHARD COLLINS & ASSOCIATES
Mechanical Engineers: **C. WARREN BOGAN & ASSOCIATES**
Structural Engineers: **J. GIBSON WILSON**

Photo: Leet-Melbrook, Inc.

The structure will consist of an 11-story and a 7-story building connected at the basement and the first floor by a cafeteria and service link.

Exterior concrete columns and spandrels on the 11-story building will be faced with precast concrete. Window walls between columns will be of glass, enameled panels and aluminum frames and mullions. The 7-story building will have similar window walls on the two long sides. Folded shape concrete slab design of the cafeteria roof permits 4 inch thick roof with 40 foot span. Entrance canopy is steel frame cantilevered from reinforced concrete roof.

. . . public building construction

U. S. POST OFFICE, OFFICE BUILDING AND GARAGE

New Orleans, Louisiana

Architects: **FRERET & WOLF**
AUGUST PEREZ & ASSOCIATES
FAVROT, REED, MATHES & BERGMAN
Structural Engineers: **B. M. DORNBLATT & ASSOCIATES, INC.**
Mechanical Engineers: **JAMES M. TODD & ASSOCIATES**
Electrical Engineers: **SCHROEDER & ASSOCIATES**

The building, which will contain 759,773 sq. ft., will cost an estimated $20,505,000. Proposed materials include granite, mosaic and spandrel panels. Construction will feature narrow stile door sections for ventilators in curtain wall; thin shell arch for railway shelter; and precast cellular slabs.

Photo: Leon Trice

This artist's rendering shows the ambassador's residence (left) and the office building (right).

U. S. EMBASSY IN MOROCCO

Rabat, Morocco

Architects: **KETCHUM, GINA' & SHARP**
Partner-In-Charge: **MORRIS KETCHUM, JR.**
Staff Architect: **OLIVIER DE MESSIERES**
Structural Engineers: **SEVERUD-ELSTAD-KRUGER, ASSOCIATES**
Mechanical Engineer: **GUY B. PANERO**
Landscape Architect: **THOMAS D. CHURCH & ASSOCIATES**

The project will consist of (1) an office building for the embassy and the consulate and (2) a residence which will serve both as a private home for the ambassador and as a center for formal public receptions. Although the two structures are separate entities with individual entrances, they have been similarly conceived in order to produce a unified group. A second floor bridge conveniently connects the ambassador's residence with his office.

Vital Statistics

Design Concept

The design of the U. S. Embassy Office Building and Residence was guided by the following considerations:

(1) Modular discipline
(2) Structural simplicity
(3) Straightforward details
(4) Economical use of materials
(5) Respect for local techniques and materials
(6) Low maintenance costs

Construction

Structure

Rhythmic, two-story reinforced concrete construction with a gently ridged roof; 660 cm. x 440 cm. bay system with a 110 cm. module.

Foundations

Reinforced concrete foundation walls and column footings.

Columns

Reinforced concrete columns built integrally with roof slab and upper level floor slab.

Floors

(1) **Lower Level:** concrete slab on grade: temperature steel (wire mesh)
(2) **Upper Level and Slab Above Basement:** two-way reinforced concrete flat slab.

Exterior Walls

(1) **Lower Level:** cavity construction: local rubble stone and locally fabricated hollow clay tile blocks. Free standing enclosure walls and retaining walls: local rubble stone. Hollow clay tile block walls around residence patio.
(2) **Upper Level:** cavity construction: pre-cast concrete panels of modular size and hollow clay tile.

Interior Partitions

Locally fabricated hollow clay tile.

Roof

Insulated, cast-in-place reinforced concrete slab, twenty-year bond built-up roofing and white marble chips.

Finishes

Floors

(1) **Interior:** Polished terrazzo as per local technique, "granito au sol": Thin layer of marble chips in rich mortar. Cement, integral or applied, in basement, storage and custodial areas. Ceramic tile in toilets and residence kitchen.
(2) **Exterior:** Combinations of local marble, ceramic tile, and pebbles imbedded in mortar on concrete slab.

Columns

Exposed concrete; grout-cleaned.

Interior Partitions

Plaster with marble dust aggregate, as per local "granito" technique on hollow clay tile. Ceramic tile wainscots (door head high) with "granito" finish above in toilets and residence kitchen. Exposed concrete walls to be grout-cleaned.

Exterior Walls

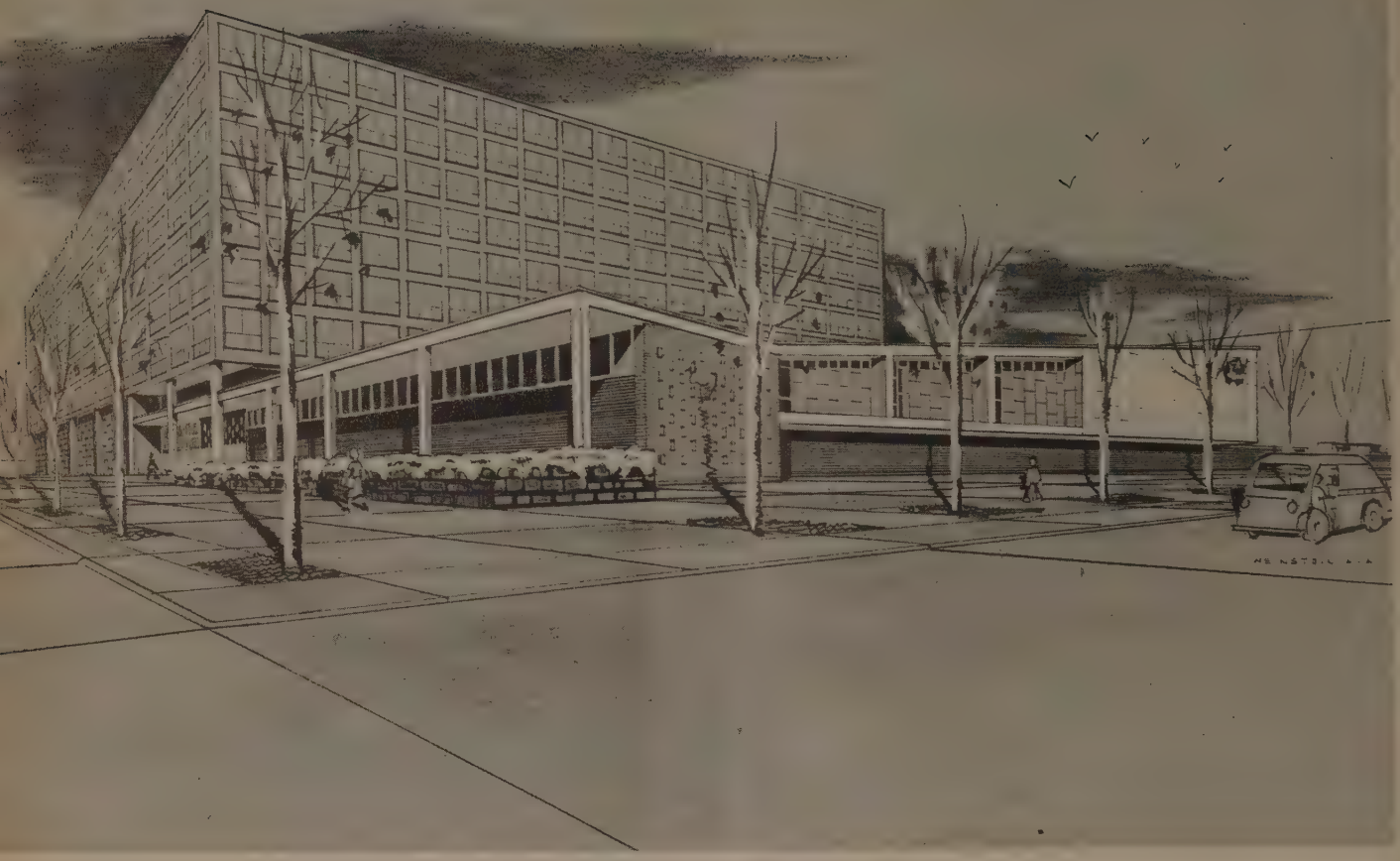
Exposed local rubble stone. Steel trowel finish on pre-cast concrete panels. "Granito" finish on hollow clay tile walls (residence patio).

Ceilings

(1) **Lower Level:** Exposed concrete slab to be grout-cleaned.
(2) **Upper Level:** Painted acoustical tile or cork applied directly to concrete slab.

Concrete slab grout-cleaned at exterior of building. Exposed concrete ceiling of garage to be painted.

Main entrance of the embassy will be pleasantly accessible through a two-story archway. Beyond the palm grove patio, visitors will enjoy a refreshing view of the entire city and the Atlantic Ocean. The four-acre site will be fully landscaped with local shrubs and trees and will contain parking space for 42 automobiles.



U. S. POST OFFICE AND COURTHOUSE

Omaha, Nebraska

Architects: **STEELE, SANDHAM & STEELE**
HENNINGSON, DURHAM & RICHARDSON
KIRKHAM, MICHAEL & ASSOCIATES

General Contractor: **J. W. BATESON**

The structure contains 434,466 sq. ft., with cost figured at $6,829,575 or $15.70 per sq. ft. Construction is concrete frame with exterior materials including granite, brick, limestone, marble, aluminum windows and glass spandrels. Building is fully air-conditioned.

. . . public building construction

West elevation showing auditorium.

Delegates Lounge.

STATE DEPARTMENT BUILDING

Washington, D.C.

Architects: **HARLEY, ELLINGTON & DAY, INC.**
Mechanical Engineers: **HARLEY, ELLINGTON & DAY, INC.**
Structural and Electrical Engineers: **GRAHAM, ANDERSON, PROBST & WHITE**
General Contractor: **McSHAIN, INC.**

East elevation of the State Department Building, now under construction.

. . . public building construction

DEARBORN CIVIC CENTER

Dearborn, Michigan

Architects-Engineers: **HARLEY, ELLINGTON & DAY, INC.**

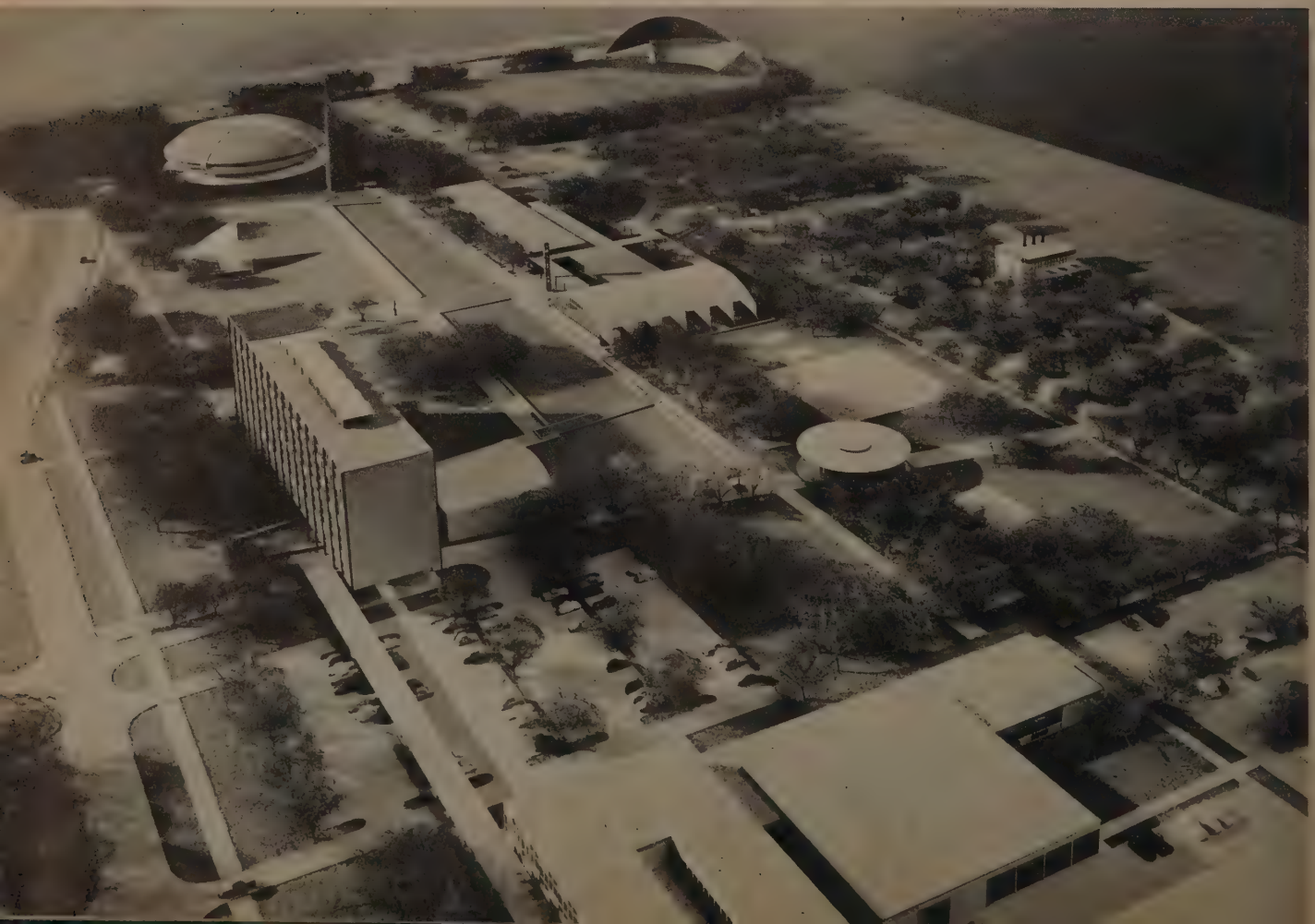
General Contractor: **PULTI-STRANG, INC.**

Situated on 50 acres of land, donated by the Ford Motor Company, the project will include a Youth Center, Police-Fire-Communications Headquarters, Auditorium-Sports Building, City Hall-Courts Building, Stadium, Power House and various recreational facilities.

Because the center is to be a stimulating and inspiring place in which people will work and play, colorful materials are being stressed. Extensive use is to be made of colored glazed brick, glass mosaic and ceramic tile panels, anodized gold aluminum, an abundance of glass and maintenance free materials on the interiors such as glazed brick, tiles and plastic wall coverings. All buildings will be air-conditioned.

The Youth Center is now under construction and the Police-Fire-Communications Building and the Power House are out for bids.

Scale model shows over-all plan.



The Police-Fire-Communications Building will have a floor area of 65,500 sq. ft. The main feature of the police wing will be the complete freedom from cross traffic of prisoners, police and the public. Separate entrances are provided for Fire Station and Signal Bureau.

Construction on the Youth Center started in May. Containing 40,000 sq. ft., it is primarily a one-story structure with a partial basement. Three basic areas are included in the plan—a multi-purpose room, roofed with a barrel domed Lamella structure covered with white marble chips, an area comprising 14 clubrooms, and another area for diversified activities.

View towards main entrance shows suburban character of the community. The higher section of the building is the meeting room while the lower is the office wing. A lobby connects the two wings, at the same time dividing them.

PARK FOREST VILLAGE HALL

Park Forest, Illinois

Architects-Engineers: **PERKINS & WILL**

Latticed brick fence encloses a garden area. The buckskin colored face brick blends with neighboring apartment buildings. Windows of meeting room have wood frames with steel operators. Windows in other parts of the building use steel throughout.

. . . public building construction

Exterior brick is repeated in the general office work area. The counter simplifies the transaction of public business. A rolling aluminum shutter hides the counter from lobby view when not in use. Oak panelling is noticeable under the counter.

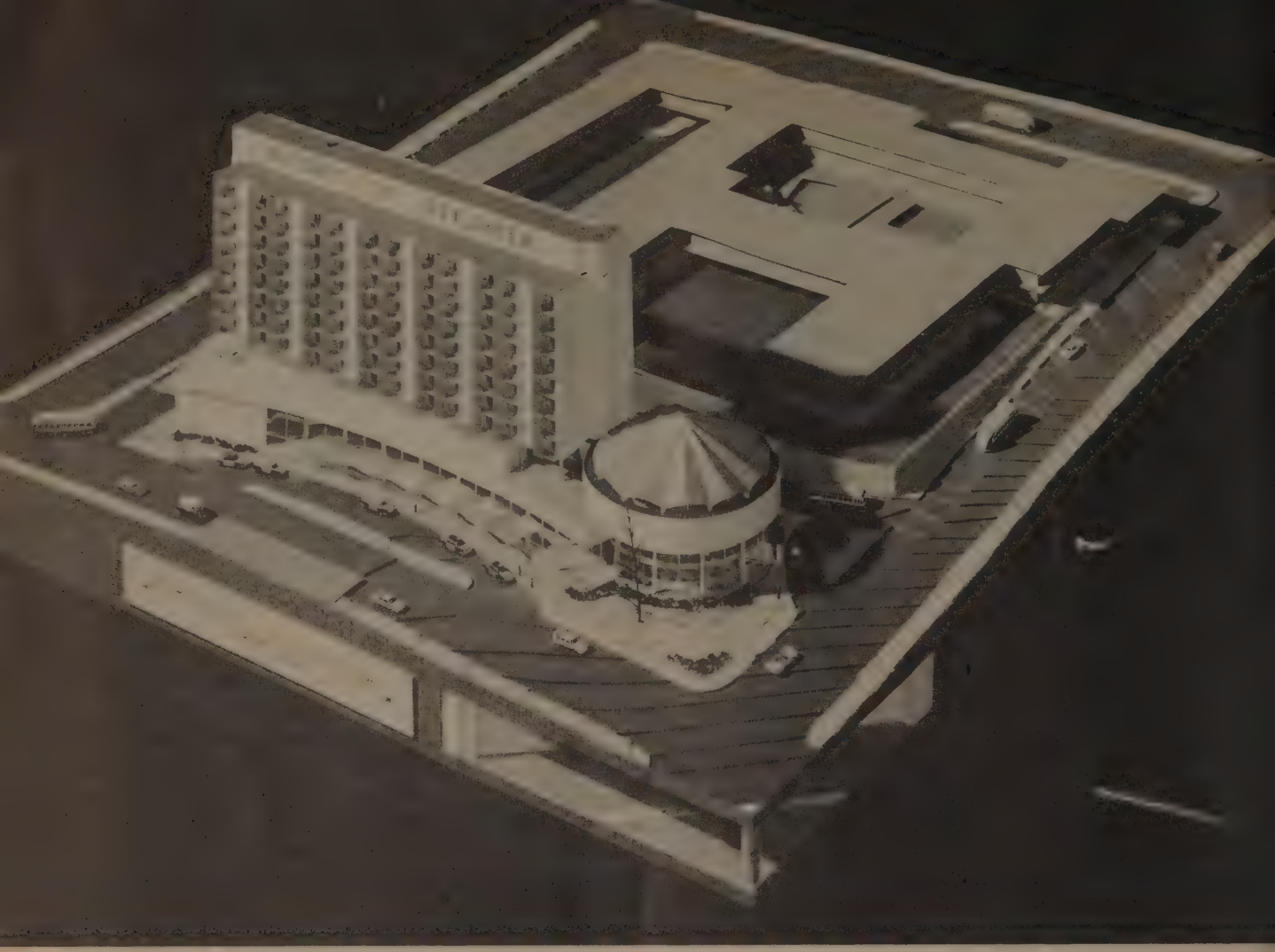
Park Forest Village Hall, a service building for a suburban community, was designed and constructed to be in keeping with the needs and environment of the community it serves. Located near the heart of downtown Park Forest, across the street from a shopping center, yet within sight of nearby apartment buildings, the 8,000 square foot village hall is constructed of buckskin colored brick, which repeats brick used in neighboring buildings.

The one-story building has steel frame and bearing wall construction. Mechanical equipment includes hot water heating, finned radiation and provision for future air-conditioning. A central utility core containing such facilities as toilets, storage spaces and mechanical areas is surrounded by office spaces.

Office partitions, independent of the building's structure, and window and light module allow offices to change shape and size as needed.

Facilities provided in the village hall include: village manager's office, water department, public health department, village planning department, general office space, public works department, local police magistrate's chamber, and meeting room. This meeting room, overlooking a walled-in garden, can be divided into two separate conference rooms with separate entrances from the lobby.

A close-up of the office wing illustrates the modular window units which establish flexible partition joints. Window and light module allow offices to change shape and size as needed without affecting the building's structure. The fascia is of porcelain enamelled aluminum. Steel columns penetrate spandrel wall and are exposed.



The building will be a combination airport, bus terminal, airline ticket offices, and a 200 room hotel above. Other facilities such as barber shop and restaurants will open on to a large lobby and mezzanine area. All baggage will be handled automatically from ticket counter through baggage room to bus. In addition, the lower floors will provide parking for airline passengers on overnight or extended trips. The large round section of the building will be a convention hall with parking adjacent on the roof. Model shows actual terrain, location of new expressway under the corner, and the existing two-story Heart of Atlanta Motel in the background.

HEART OF ATLANTA AIRTEL

Atlanta, Georgia

Architect: **JOHN W. CHERRY**

General Contractor: **JOHN W. CHERRY**

LOVE FIELD TERMINAL BUILDING

Dallas, Texas

Architects: **BROAD & NELSON & JACK CORGAN**

Structural Engineers: **BROAD & NELSON & JACK CORGAN**

Mechanical Engineers: **ZUMWALT & VINTHER**

Civil Engineers: **FORREST & COTTON**

Planning Consultant: **JAMES BUCKLEY**

Landscape Architect: **J. DONALD WALP**

General Contractor: **T. C. BATESON CONSTRUCTION COMPANY**

Situated on 1,250 acres, the Love Field Terminal Building contains 488,700 square feet and was built at a cost of $7,659,000 or $15.80 per square foot.

Love Field Airport, which has parking facilities for 1,700 cars, has 27,000 plane movements per month. The Federal Airways Traffic Activity Report for the fiscal year ending June 30, 1957 reports that Love Field ranks third in the United States for itinerant aircraft with 277,910 plane movements and fourth for total operations with 298,983 movements.

The airport building is planned for ground level operation with approach to all loading piers and the 26 plane positions at the floor level of the Terminal. Each of the three fingers of the "T" shaped passenger service exit has a hump to create an underpass for field service trucks. Six moving sidewalks, each about a block long, carry passengers over the humps to the first gate in each loading pier. The three fingers of the "T" are color-coded to simplify instructions.

The Ticketing Wing with 365 feet of ticket counters points directly to the "T". The Baggage Wing, with 120 feet of mechanized, self service reclaim counter, is at the opposite side of the lobby in direct line with the same feature.

Truck access directly to the basement of the building is provided below the office wing for loading and unloading. This also provides access for service

(Continued on page 68)

trucks to equipment spaces under the entire first floor.

Elevators to the five story office building open off the main lobby.

Exterior walls are porcelain-enameled curtain wall panels with windows set in structural aluminum mullions. Panels may be removed and interchanged in the three service fingers. Windows are sun shaded at each floor on the north and south, while the west wall is blank except for "Solex Twindow" units at the second floor restaurant.

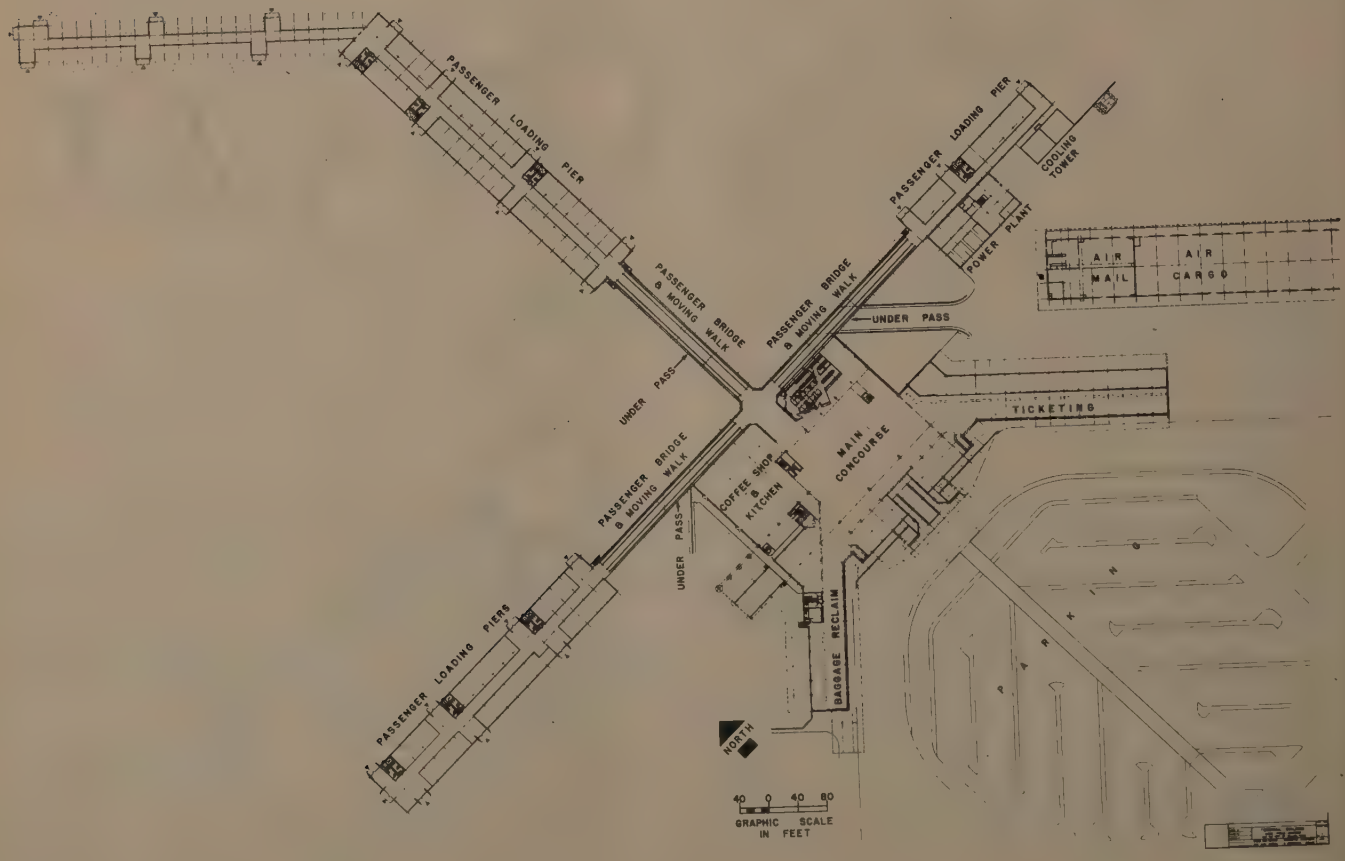
Foundations under the main building are driven Raymond concrete piles, 40 feet long. Drilled piers and bellbottom footings are used for the fingers and for the service building and air cargo building. Frame is structural steel fireproofed with metal lath and plaster. Office building floors are Robertson-Q floors with lightweight fill. Entire first floor is concrete joist and pans. 135,000 sq. ft. of terrazzo are used on the main floor and observation balcony. Insulated built-up roof has precast concrete blocks for walking to weather bureau equipment.

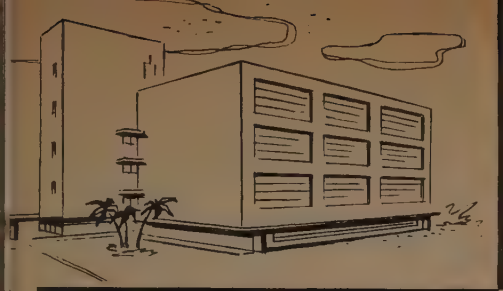
Electric energy is delivered to the Airport at 12,000 volts. There it is transformed by the Dallas Power & Light Company and sold to the City at 4,160 volts. At this voltage it is distributed to five local sub-stations where it is again transformed to 120/208 volts, 3 phase, 4 wire for use in building.

The air conditioning is supplied by two 600 ton compressors. Chilled water is distributed through tunnels to secondary recirculating pumps at various load centers. It is calculated that a drop of chilled water traveling from the water cooling unit to the furthest possible point moves about 4,500 feet.

Four cooling systems are used:

1. In the office areas, high velocity inductor units at the windows are coupled with conventional low velocity interior zone distribution.
2. Rentable areas in the piers are air conditioned by high velocity single duct systems.
3. Control Tower has a dual system, with a direct expansion Freon unit as a standby in case of failure of the central system.
4. Other areas have conventional low velocity duct systems, supplied from convenient unit rooms.





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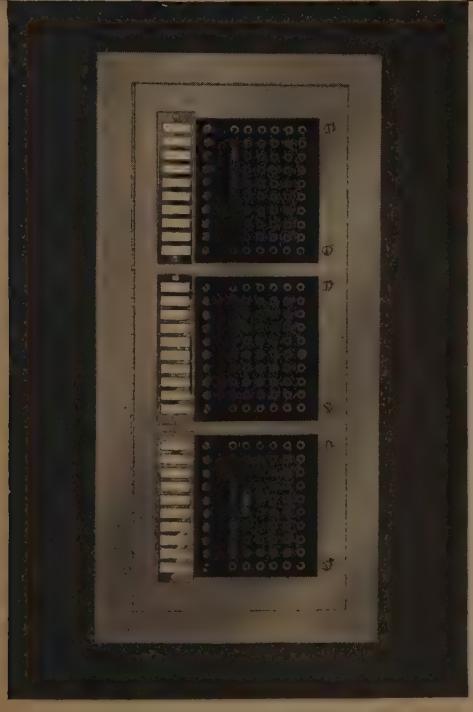

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Quick and Easy installation. Standard plug-and-socket electrical connections.

Optional spring-reserve power unit. Keeps master clock and program unit running during power failures up to 12 hours. Returns entire system automatically on power return and rewinds reserve power.

Fully self-regulating time. Automatic time-checks correct each clock, hourly and independently for discrepancies.

Precision-link programming. Simplest, most accurate and trouble-proof system on the market. Heavy-duty metal program chains, easily identifiable for day and night. Drum marked for quick indication of minute of day for program setting.

Pin-set programming rollers. Pins are quickly, easily inserted into chain links for signals at any minute of the week and in any sequence desired. Plastic, reusable components save bother and expense in resetting schedules.

Trunnion-mounted programming mechanism. Swings out from wall to provide easy access for program-setting.

Signal-duration easily varied.

Manual signalling or circuit-silencing. Switch on master clock permits substituting manual switching or silence instead of automatic programming. Quick-change calendar device permits silencing any circuit during any 12-hour period of the week.

*Trademark

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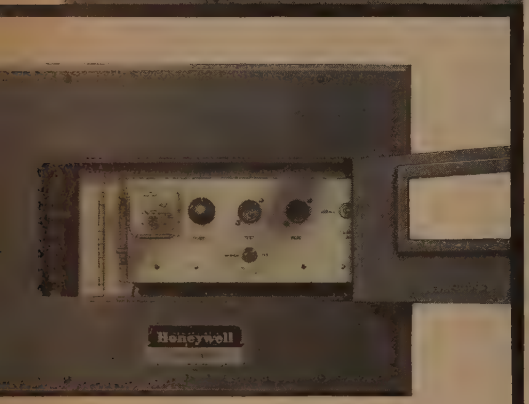

W247 PANEL

W237 PANEL

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Simple Circuitry Assures Dependable Protection. All Honeywell W237 Fire Detection and Alarm Systems use a two-wire, closed circuit detector-station-switch circuit. The Circuit is so designed that a fire alarm may be transmitted even after one or both of the wires have been broken. The circuit is electrically supervised so that any break in the wiring will be evidenced immediately by a distinct trouble signal. A switch is provided so that the signal may be silenced until repairs are completed. The trouble light stays on while bell is silenced.

The W247 Fire Detection and Alarm System uses a two-wire circuit designed so that both detector and alarm circuits are electrically supervised, and any break in the wiring will be indicated by a trouble signal. Systems are available for coded, noncoded or master coded applications. For those systems connected to a municipal alarm, a switch is provided to manually disconnect the municipal alarm during fire drills or testing. Four separate alarm circuits provide a capacity of from 1 to 40 signals.

Flexible Systems Provide the Most Thorough Coverage. You may choose from a complete line of Honeywell fire detection and alarm systems and a variety of system combinations to meet the exact requirements of your building.

Manual, automatic and sprinkler-water-flow alarm systems are all available, singly or in combinations. These systems may include Honeywell-built control panels, automatic detectors, manual stations, switches, bells, horns, and buzzers, to form complete systems, either coded or noncoded.

A Wide Choice of Equipment Gives Tailor-fitted Results

Nine models of Fire Detection and Alarm Panels
Two basic Fire Detector Units
Five types of Signal Bells
Eleven variations of Signal Horn
plus a Manual Fire Alarm Station

In Addition, You May Specify Special Features As Needed:

Auxiliary Contacts for connection with municipal alarm boxes or fire and police headquarters or for connection through leased telephone lines.

Emergency Switching Facilities for transfer to battery power during power system failure — to provide complete fire protection — even during power failure.

One to Sixty Zone Annunciator to indicate area in which fire has been detected.

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ENGINEERS: AMMANN & WHITNEY • GENERAL CONTRACTORS: GROVE, SHEPHERD, WILSON & KRUGE, INC.
ARCHITECTURAL COORDINATION BY PORT OF NEW YORK AUTHORITY

Why Hangar Design and Hangar Door Engineering Should go Hand-in-Hand

Supplying doors for modern hangars requires a type of engineering that goes far beyond the simple matter of filling openings. The basic problem is to integrate the doors with the structure for functional efficiency. This necessitates the construction of hangars that are designed to support door loads and to allow space for the doors and their controls.

That is why The Peelle Company can be most helpful if consulted at the beginning of the hangar planning stage. Then the Peelle engineering department can work along with the designers to supply the most satisfactory doors that can be engineered into the main structure before it becomes too late to adapt the design of the hangar to accommodate the doors.

The TWA service hangar at the New York International Airport, illustrated on this page, offers a good example of the coordination of Peelle door engineering and hangar design. This building has two hangar doors, each for an opening size of 819′-2″ long x 48′-8½″ high.

The doors for this hangar were designed with conventional panels, topped with pivoted inclined panels to provide extra floor space and, at the same time, to reduce the cantilever dimension. Due to the pivoted design of the inclined panels, a total upward and downward deflection of 30″ is provided for.

Peelle engineering offers you a wealth of practical know-how and experience in the solution of hangar door problems.

ENGINEERED FOR THE BUILDING INDUSTRY
PEELLE-RICHMOND PRODUCTS

SEE REVERSE SIDE OF THIS PAGE FOR ADDITIONAL ENGINEERING DATA ▶

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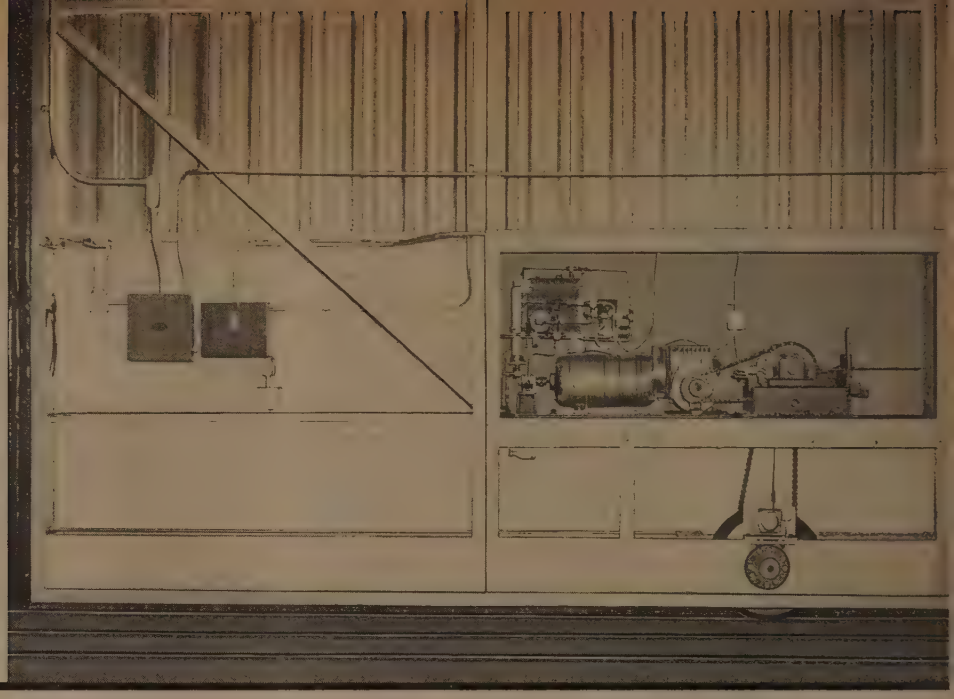
AIA FILE NO. 16-D



PEELLE HANGAR DOORS

PEELLE HANGAR DOORS NEARING COMPLETION IN THE TWA JET TRANSPORT MAINTENANCE HANGAR AT NEW YORK INTERNATIONAL AIRPORT

STRUCTURAL DETAILS OF TWA HANGAR DOORS

Above photograph shows a partial interior elevation of the hangar doors. The door panels were constructed of structural steel channel framing in convenient sizes for shipment and assembly at the job site. The lower seven feet of the door panel exterior covering is a twelve-gauge flat steel sheet with the balance of the vertical facing on the door panels of fluted aluminum siding. This facing material is easily varied to suit the individual preferences of architects or owners.

MOTOR DRIVE UNIT

The above photo shows the bottom support wheel equipped with a floating brake disk with a hydraulically operated spot brake. The stopping distance of the door panel is determined upon the pressure applied to the brake, which is easily adjusted to increase or shorten the brake-stopping distance. This driven wheel is motivated by the integral motor, fluid coupling, gear reduction unit through an intermediate jack shaft assembly. This assembly is designed to permit disengagement of the motor drive so as to facilitate operation of the doors by either a crank handle operator or a tow bar, in the event of power failure. The jack shaft assembly is also equipped with a torque-limiting device to control the amount of tractive force applied to the wheels in the event of an obstruction in the path of the door.

HYDRAULIC BRAKE SYSTEM

Pressure in the hydraulic system is obtained by the pump attached to the high speed shaft of the motor with all auxiliary hydraulic equipment necessary to make a complete installation and the pressure maintained by an accumulator.

All electric controls are mounted on the door panel and receive their power supply from a fixed overhead, copper bars and sliding trolley.

SAFETY LEADING EDGE

To the left of the same photograph is shown a leading edge of the door panel equipped with a soft, sensitized leading edge arranged to stop the door if it should come in contact with an obstruction.

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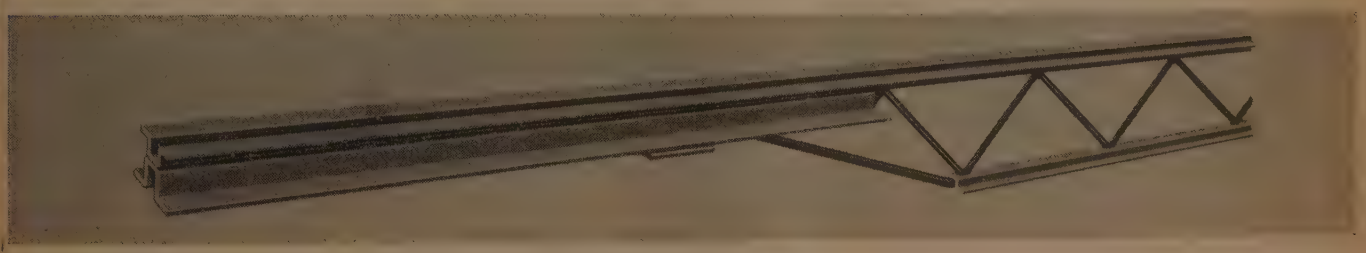

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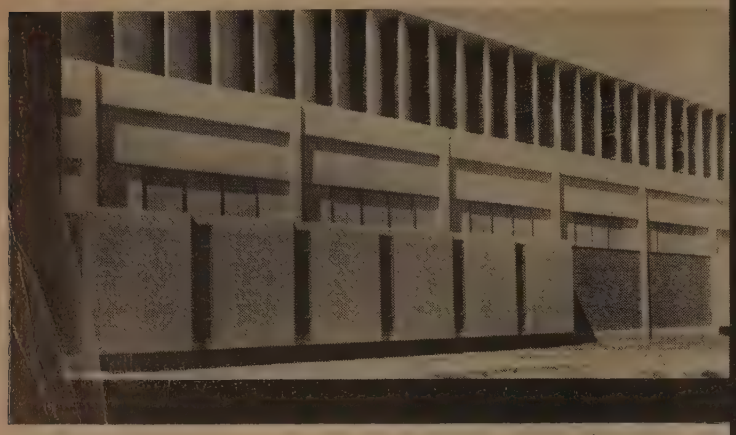

Truscon Heavy-Intermediate Projected and Donovan Steel Windows
St. Catherine of Sienna Church, New Orleans, Louisiana
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Architects: Hausner and Macsai
Contractor: Crane Construction Company

Truscon Donovan Steel Windows
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Architects and Engineers: William R. Burk Associates
Contractor: Perrilliat-Rickey Construction Company

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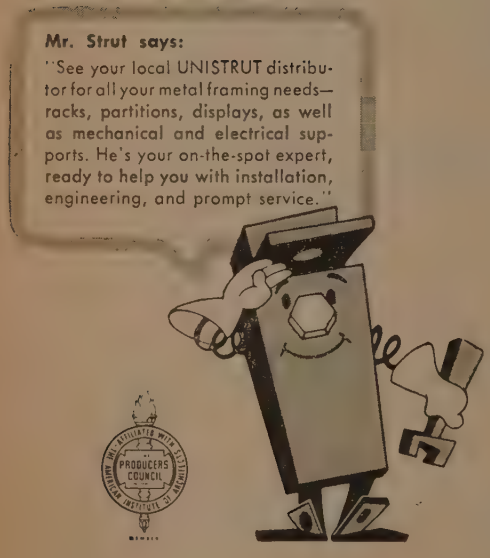
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METHODS OF LAYING TERRAZZO

BONDED TO CONCRETE — *The concrete fill is provided for elsewhere, and should be left at least 1¾ in. below the finished floor. This concrete fill can be made of cement, sand, and coarse aggregates in the proportion of 1:2:4. Crushed stone or gravel are generally used as aggregates for concrete fill under terrazzo floors. Before the terrazzo contractor installs his underbed, he must see that the surface of the concrete slab is thoroughly cleansed of plaster droppings, wood chips and other debris. He should thoroughly slush it with neat cement grout to insure a good bond. The grout must not be allowed to dry out before placement of the topping.*

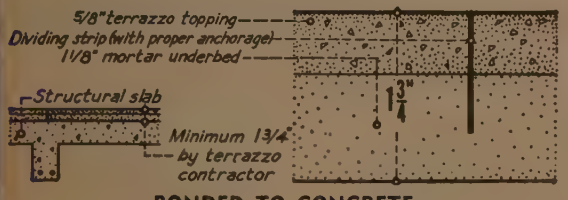
SAND CUSHION OVER CONCRETE — *Where cracking is anticipated, either from settlement, or expansion or contraction, or vibration. In this case, the terrazzo contractor carries his work from the structural slab up. This method requires a total thickness of at least 3 inches. The concrete slab is covered with a thin bed of dry sand, over which is laid overlapping 15# asphalt impregnated roofing felt. Over this, lay a reinforced wire fabric, lapping 4 inches, over which the underbed is installed, as in the first method. When this method is used, the cracks originating in the structural slab, terminate at the sand bed and are not likely to appear on the finished surface.*

OVER JOISTS OR WOOD CONSTRUCTION — *A thickness of not less than 2 inches is required, and the followng procedure should be followed:*

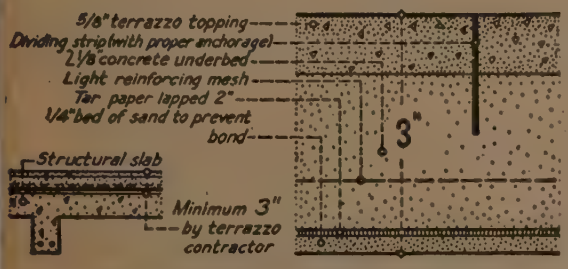
First, cover the wood floor with overlapping 15# asphalt impregnated roofing felt. Over this, lay reinforcing wire fabric lapped 4 inches. Then proceed to lay the concrete underbed as specified under the second method.

DIRECTLY OVER EARTH — *Special precautions must be taken to provide a vapor barrier. The concrete slab shall have a minimum thickness of 4 inches and shall be reinforced with wire mesh. The slab shall be separated from the natural ground surface by overlapping 15# asphalt impregnated roofing felt, plastic sheeting or other approved waterproofing material. In areas having excessive rise of ground water, special care should be exercised to insure waterproofness. The edges of the slab as well as the bottom may require waterproofing. This should be done with an accepted compound, or waterproofed Portland cement. This vapor barrier is of the utmost importance in preventing the accumulation of water on the finished floor and thereby in the rooms themselves. The accumulation of water on the floor surface would also discolor any metal floor dividing strips.*

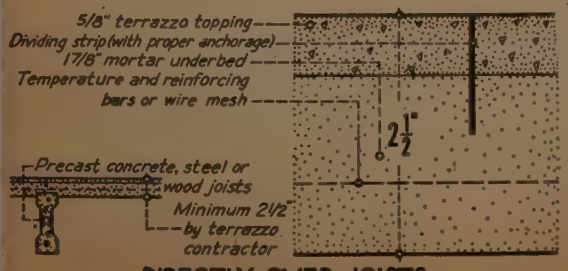
TERRAZZO FLOORS



BONDED TO CONCRETE



SAND CUSHION OVER CONCRETE


5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 7/8" mortar underbed
Temperature and reinforcing bars or wire mesh
Precast concrete, steel or wood joists
Minimum 2 1/2" by terrazzo contractor
2½"

DIRECTLY OVER JOISTS

Terrazzo topping-200 lbs. marble granule to not less than 100 lbs. white or gray portland cement. Mortar underbed 1 cement: 4 sand. Dividing strips to be indicated on plans and/or specified to show: 1). Depth: (1¼" is standard). 2). Gage or face thickness. 3). Material: Brass, zinc or composition. 4). Spacing and arrangement.

SPECIFICATIONS

STANDARD AND SPECIALIZED TERRAZZO

NATIONAL TERRAZZO AND MOSAIC ASSOCIATION

PROCEDURES FOR LAYING TERRAZZO FLOORS

UNDERBED: The underbed for terrazzo, consisting of one (1) part of Portland cement, and four (4) parts of coarse screened sand, shall be spread and brought to a level not less than ⅝ inch below the finished floor.

STRIPS: Into the underbed, while still in a semiplastic state, install divider strips. These shall be 1¼ inch deep and have proper anchoring features; or preassembled decorative units may be used. Strips shall form borders, and divide the fields into panels.....x .....in size, or as shown on the drawings.

NOTE: The strips used in terrazzo floors are made of half-hard brass, white alloy zinc (99% zinc) and plastic in various colors. The thickness of the strips shall be specified, using Brown and Sharp gauges or the fractions of an inch. Strips less than ⅛ inch thick are made of uniform thickness for their entire depth. Strips ⅛ inch and thicker are made of the "heavy top" type, with the top member having a minimum wearing depth of ¼ inch, and a thin bottom member.

TERRAZZO TOPPING: The terrazzo topping shall be not less than ⅝ inch in thickness, and shall be of granulated marble. The color, kind and size of marble chips, as well as the stipulation for the use of white or gray Portland cement for the matrix, shall be specified by the architect. In lieu of this detailed specification, the color charts as shown in the Third Edition Catalogue of the N.T.M.A. may be listed by number. The topping shall be uniform in composition, and the same marble granules that appear on the surface shall be used for its entire thickness. The chip sizes most used in regular terrazzo are numbers 1 and 2, and sometimes number 3.

MIX: Composition for terrazzo shall be in the proportion of two hundred (200) pounds of marble aggregate to one bag (94#) of gray or white Portland cement, mixed dry. For every bag of cement, add a measured 5 to 5½ gallons of water, to make the mix plastic, but not flowing. An unnecessary excess of water is harmful. Where the cement is to be colored to obtain a desired shade, the color pigments shall be lime-proof and of a non-fading quality. Color pigments shall be added by weight and not by volume.

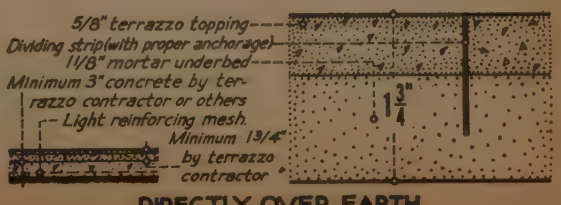
INSTALLATION: A minimum of one day after the underbed and strips have been laid, saturate the underbed with water, and remove the excess before laying the terrazzo topping. The mix shall then be placed in the spaces formed by the dividing strips, and rolled into a compact mass by means of heavy stone or metal rollers, until the superfluous cement and water are extracted; after which, it must be hand trowelled to an even surface, disclosing the lines of the strips on a level with the terrazzo fill. The finished surface shall show approximately 85% of marble granules.

CURING: The floor shall be kept moist for the next six (6) days at least, by wet sand, paper or curing mats.

SURFACING: When the floors have set sufficiently hard, they shall be machine rubbed, using number 24 grit or finer abrasive stones for the initial rubbing. They shall then be resurfaced using number 80 grit or finer abrasive stones, after which a light grouting of neat Portland cement of the same kind and color as the matrix, shall be applied to the surface, filling all voids. The grouting shall remain until the time of the final cleaning. All grinding shall be done in the presence of an excess of water.

FINISHING: Floors shall have the grouting coat removed by machines, using stones not coarser than number 80 grit. This cleaning or fine-stoning shall not take place sooner than seventy two (72) hours after the floor has been grouted, after which it must be cleaned thoroughly. It now is sealed with proper sealing material as recommended by member maintenance firms of the N.T.M.A.

WARNING: Acids are injurious to terrazzo, and must not be used.


5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 1/8" mortar underbed
Minimum 3" concrete by terrazzo contractor or others
Light reinforcing mesh
Minimum 1 3/4" by terrazzo contractor
1¾"

DIRECTLY OVER EARTH

NON-SLIP FLOORS: Ramped or other surfaces in terrazzo floors so specified, are to be made non-slip by the addition of an abrasive aggregate.

For heavy duty floors, the proportions shall be two (2) parts of abrasive to four (4) parts of marble granules, and the abrasive aggregate shall be mixed in the terrazzo topping for its entire thickness. For light traffic floors, the abrasive shall be sprinkled on the surface only, so that the approximated 85% aggregate surface in the finished floor is three (3) parts of marble granules and one (1) part of abrasive aggregate.

A good non-slip surface can also be obtained by the surface sprinkle method as follows:—For light traffic floors, ¼ pound abrasive aggregate per square foot, and for heavy duty floors, ½ pound of abrasive aggregate per square foot of floor area.

LAYING TERRAZZO WITH VERTICAL FORMS

TERRAZZO BASE, ETC.—Where shown on plans or specified provide a base..... inches in height, coved at the floor to..... radius, the top projecting ¼ in. beyond the line of finished plaster.

NOTE: If base is required without projection at top, specify it to be set flush with the finished plaster. Metal base screens or any temporary grounds are furnished and set by others, and should be specified under another heading.

Base shall be divided into sections not exceeding five (5) lineal feet, using base dividers of B. & S. gauge No. ..... The walls back of the base shall have a scratch coat of cement and sand mortar brought to a line ⅜ in. back of the finished face of the base, into which the base dividers shall be set.

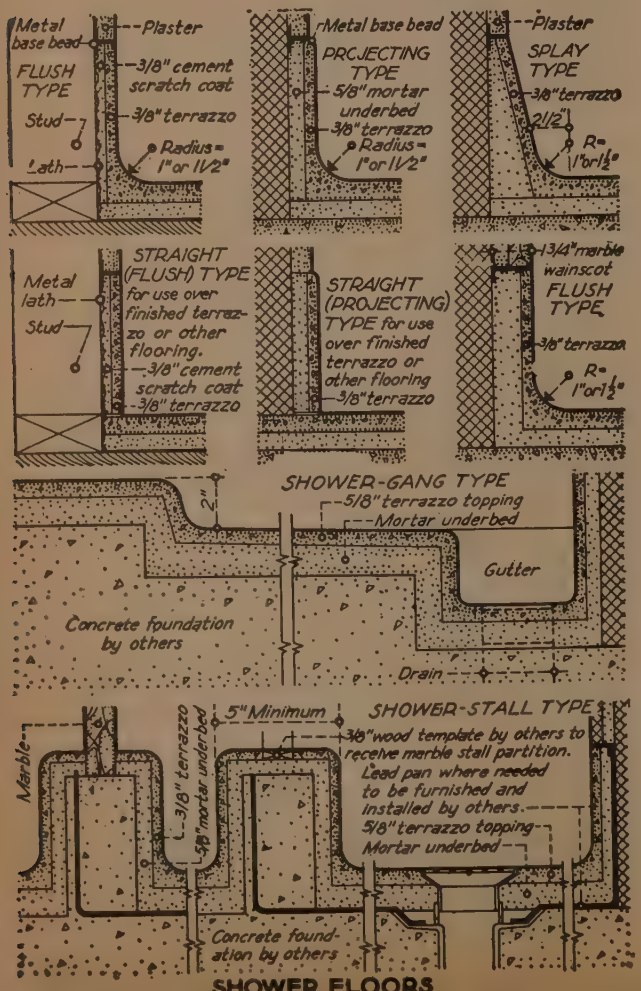
NOTE: If base is to be applied against wood or metal studding, metal lathing must be provided for under lathing specifications.

The surfacing and grouting of terrazzo base shall be done in all respects as described above for the floor. Base shall be finished with a very fine stone, so as to leave the surface at a hone finish. Specifications should state whether terrazzo plinth blocks are required, and whether moulded or plain.

TERRAZZO STAIRS—Where terrazzo stairs are shown or specified to be built upon a concrete slab, the concrete contractor shall form the rough concrete work so as to allow 1½ in. from the top of rough concrete to the top of finished terrazzo tread, and 1 in. from the face of rough concrete riser to finished terrazzo riser.

TERRAZZO BASES AND SHOWER STALLS

SCALE OF DETAILS - 1½" = 1'-0"



SHOWER FLOORS

The rough concrete for strings and curbs shall be so placed by the concrete contractor, so as to allow 1 in. for the scratch-coat and finished terrazzo.

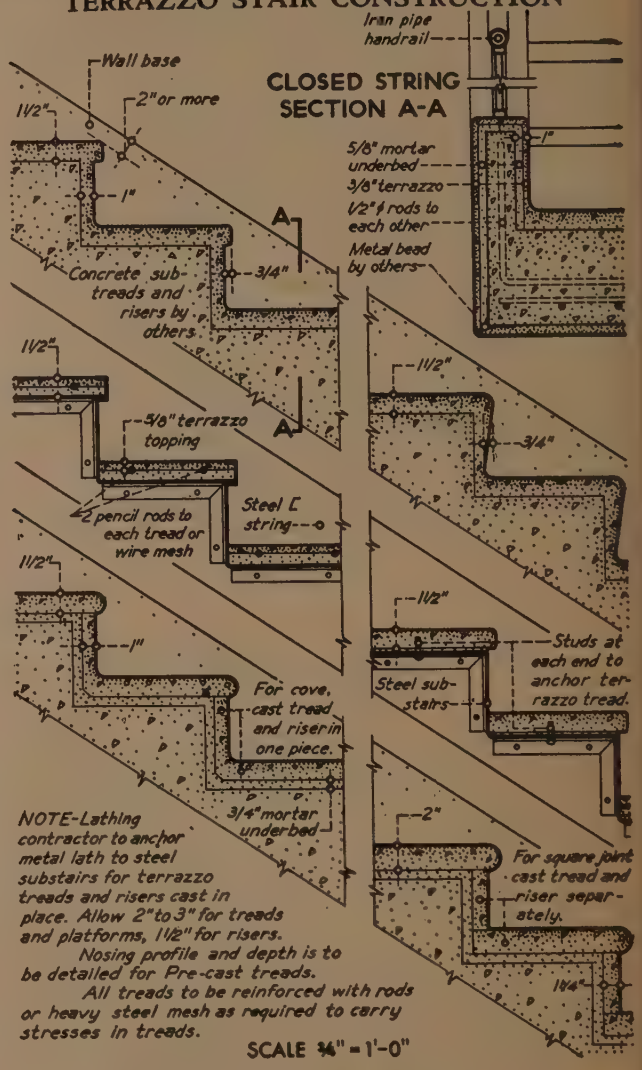
Where steel stairs are installed to be finished with terrazzo, same are to be covered with metal lath securely anchored to steel sub-stairs by the lathing contractor, allowing for terrazzo at least 2 in. on the tread, and 1½ in. on the riser. Platforms are to be treated in the same manner, allowing not less than 2 in. for terrazzo and setting bed.

On pan-type stairs where treads only are to be of terrazzo, 1½ in. shall be allowed for terrazzo and setting bed.

Pan treads and platforms must be well reinforced with steel pencil rods. Thickness of terrazzo topping shall be ⅝ in.

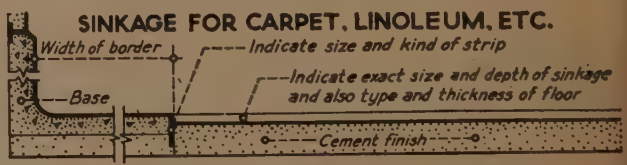
NON-SLIP WORK—Treads, Platforms, and Landings shall be made non-slip by mixing 40% abrasive aggregate with 60% marble granule. Colors of marble granule and abrasive aggregate to be as selected.

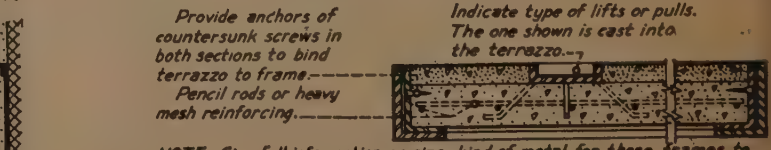
TERRAZZO STAIR CONSTRUCTION


Iron pipe handrail
Wall base
CLOSED STRING SECTION A-A
2" or more
1½"
1"
⅝" mortar underbed
⅜" terrazzo
½" ϕ rods to each other
Metal bead by others
A
¾"
Concrete sub-treads and risers by others
1½"
⅜" terrazzo topping
2 pencil rods to each tread or wire mesh
Steel C string
1½"
1"
For cove, cast tread and riser in one piece.
¾" mortar underbed
NOTE-Lathing contractor to anchor metal lath to steel substairs for terrazzo treads and risers cast in place. Allow 2" to 3" for treads and platforms, 1½" for risers.
Nosing profile and depth is to be detailed for Pre-cast treads.
All treads to be reinforced with rods or heavy steel mesh as required to carry stresses in treads.
1½"
Studs at each end to anchor terrazzo tread.
Steel sub-stairs
2"
For square joint cast tread and riser separately.
1¼"

SCALE ¾" = 1'-0"

SINKAGE FOR CARPET, LINOLEUM, ETC.


Width of border
Indicate size and kind of strip
Indicate exact size and depth of sinkage and also type and thickness of floor
Base
Cement finish


Provide anchors of countersunk screws in both sections to bind terrazzo to frame.
Pencil rods or heavy mesh reinforcing.
Indicate type of lifts or pulls. The one shown is cast into the terrazzo.

NOTE- Give full information on size, kind of metal for these frames to be furnished and set by the terrazzo contractor.

TRENCH COVER

AYING TERRAZZO WITH VERTICAL FORMS

TERRAZZO WAINSCOTS—Under another heading, walls that are o be finished with terrazzo are prepared with a scratchcoat of Portland cement and sand to within 1 in. of finish. Where wall urfaces are of an absorbent material, the plasterer shall use water- roofed cement with the sand for the scratchcoat.

The terrazzo contractor shall apply his setting bed mortar over he scratchcoat to within ⅜ in. of the finished face. This shall be omposed of one (1) part cement and three (3) parts sand.

Dividing strips No.....gauge shall be inserted in the setting ed forming bases and caps and dividing the dado into sections, all s shown on the plans. The terrazzo finish shall then be applied, ressed, and troweled plumb and true.

Terrazzo wainscot shall finish flush with plaster above or roject.....inches beyond same as shown on plans. Terrazzo vainscot shall be machine rubbed and brought to a smooth hone inish (or to a polished finish).

TERRAZZO PARTITIONS—Metal lath construction shall be pro- ided by metal lath contractor as follows: Erect forms of metal tudding placed not over 12 in. c. to c. and securely fastened at orners, at walls, and over openings; and well bedded into floors. his framing shall be covered with galvanized expanded metal lath.

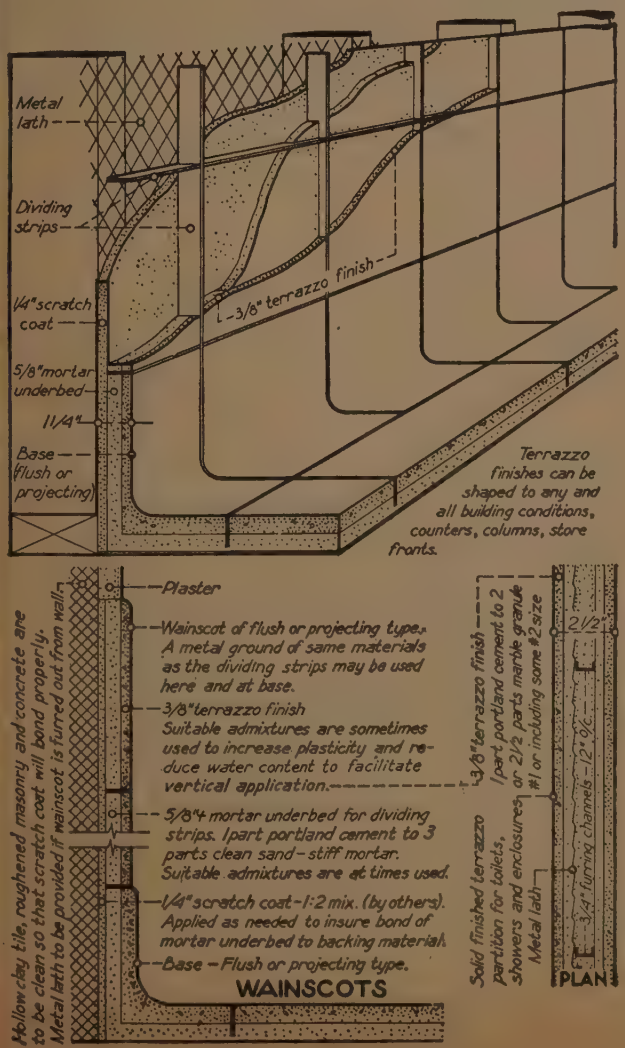
Plaster contractor shall apply to the metal lath a scratchcoat of ne (1) part of Portland cement and two (2) parts screened sand, lumb and true, to within 1 in. of finished face.

Upon surfaces thus prepared the terrazzo contractor shall apply nd install the setting bed and terrazzo finish.

The finished thickness of partition shall not exceed 2½ in.

Terrazzo partitions shall be machine rubbed and brought to a mooth hone finish (or to a polished finish).

TERRAZZO WAINSCOTS AND PARTITIONS


Metal lath
Dividing strips
1/4" scratch coat
5/8" mortar underbed
1 1/4"
Base (flush or projecting)
3/8" terrazzo finish
Terrazzo finishes can be shaped to any and all building conditions, counters, columns, store fronts.
Plaster
Wainscot of flush or projecting type. A metal ground of same materials as the dividing strips may be used here and at base.
3/8" terrazzo finish
Suitable admixtures are sometimes used to increase plasticity and reduce water content to facilitate vertical application.
5/8" mortar underbed for dividing strips. 1 part portland cement to 3 parts clean sand - stiff mortar. Suitable admixtures are at times used.
1/4" scratch coat - 1:2 mix. (by others). Applied as needed to insure bond of mortar underbed to backing material.
Base - Flush or projecting type.
Hollow clay tile, roughened masonry and concrete are to be clean so that scratch coat will bond properly. Metal lath to be provided if wainscot is furred out from wall.
WAINSCOTS
3/8" terrazzo finish
1 part portland cement to 2 or 2½ parts marble granules #1 or including some #2 size
2½"
Solid finished terrazzo partition for toilets, showers and enclosures
Metal lath
3/4" furring channels - 12" o/c
PLAN

MONOLITHIC TERRAZZO SPECIFICATIONS

Definition— Monolithic terrazzo is a mixture of portland cement, marble chips and water, so constructed as to be bonded to or integral with a prepared concrete slab. The terrazzo should be installed ⅝" thick.

It is an economical type of terrazzo, developed to give architects, owners and builders, a terrazzo floor at a low cost. This type of floor should not be confused with the normal terrazzo floors as recommended by the National Terrazzo and Mosaic Association, where the total fill over the concrete is specified to be 1¾ to 3 inches.

Concrete Base or Slab— When the concrete slab is laid directly on a natural ground surface, it shall have a minimum thickness of four inches and shall be reinforced with wire mesh. The slab shall be separated from the natural ground surface by one of the following materials: Overlapping 15# asphalt impregnated roofing felt, plastic sheeting or other approved waterproofing material. In areas having excessive rise of ground water, the concrete shall also be waterproofed with an accepted compound, or waterproofed portland cement. This vapor barrier is of the utmost importance in preventing the accumulation of water on the finished floor and thereby in the rooms themselves. The concrete shall be mixed and placed in accordance with the building code of the area, or by specifications by others, designating special requirements. The slab shall be broom finshed to remove all laitance and to leave a slightly roughened surface to insure a bond between the concrete and the terrazzo finish. The surface of the slab shall not vary in any direction more than ⅛" when tested with a ten foot straight edge. The straight edge shall be lapped one half its length as the test is being made. The concrete slab shall be cured by either ponding water on the surface, or maintaining a wetted covering of sisalkraft paper.

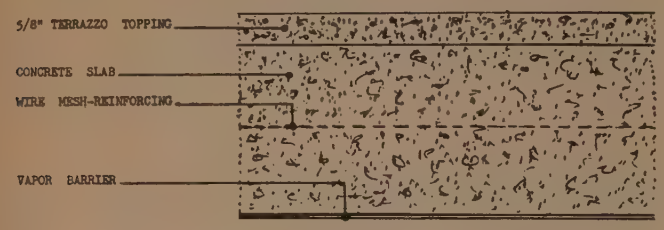
Where a pitch in the finished floor is desired, the concrete slab should be pitched to the required degree.

Terrazzo Mixture— The terrazzo mixture shall be composed of 2 to 2½ parts of marble chips, to one part of portland cement. The color, kind and size of marble chips, and either white or gray portland cement, shall be specified by the architect, owner or builder before the contract agreement is signed. One part of marble chips shall equal 100# and one part of portland cement shall equal one 94# sack. The mixture shall be of uniform composition of the several kinds and colors of marble chips. The practice of placing a uniform mixture of chips of one color and sprinkling several other colors of chips on the surface, before the rolling is started, is not acceptable. If color is used in the mixture, it must be weighed and not measured.

Mixing— All materials, including water, shall be mixed in a mechanical mixer for not less than two minutes after all of the materials are in the drum. Only amounts shall be mixed which can be placed immediately. Any mixture which has been in the drum thirty minutes, or which has

passed the time of initial set, shall not be used under any circumstances. The entire contents of the drum shall be discharged before any material for a succeeding batch shall be placed in the drum. The mixer shall not be loaded with more material than the manufacturer's rated capacity.

Mixing in a mortar box is permissible, and a good uniform mixture can be produced. Mixing on a flat surface such as the concrete slab, will not give good results.



MONOLITHIC TERRAZZO ON NATURAL GROUND SURFACE

The placing, rolling, curing, grinding and finishing of Monolithic Terrazzo is generally similar to conventional type Terrazzo as described in the Standard Specifications given previously in this brochure. Complete specifications on Monolithic Terrazzo will be sent on request.

VENETIAN TERRAZZO SPECIFICATIONS

Shall be installed under the same basic instructions given for the underbed and topping with the following exceptions: The terrazzo topping must be a minimum of 1 inch in depth in order to accommodate the large size chips, and should be kept at least ⅛ inch above the strippage to allow for grinding. Divider strips used in Venetian Terrazzo must be a minimum of 1½ inches in depth. The sizes of the marble chips used in this type of terrazzo run from numbers 4 to 10.

CONDUCTIVE TERRAZZO

In laying this type of floor, the concrete slab must be at least 1¾" below the finished floor surface. Before the terrazzo contractor installs this underbed, he must see that the surface of the concrete slab is thoroughly cleaned of all plaster droppings, wood, chips and debris.

Wire Mesh—On the clean concrete slab is laid galvanized iron mesh of not more than 2" mesh, overlapping by approximately 2 inches. Grounding of the mesh is not required. In order to prevent the moving of the mesh during the following operation, the overlapping portions of the mesh are wired together with soft baling wire.

Underbed—The underbed of terrazzo, consisting of one part of portland cement (mixed with 3 lbs. of acetylene black for every 100 lbs. of dry cement) and four parts of coarse screened sand, shall be spread and brought to a level ⅝" below the finished floor surface. The acetylene black shall be equal to that made by the Shawinigan Products Corp., Empire State Building, New York, N. Y., of 50% or 100% compression.

We acknowledge the assistance of The American Institute of Architects in editing the subject matter and form of presentation.

Dividing Strips—These shall be 1¼" x ⅛" or 1¼" x 3/16" heavy top plastic strips (top member non-conductive) on galvanized steel bottoms. They shall be set on 2' x 2' panels, and color and size shall be chosen by the architect. These strips are available in black, white, yellow, red, green and silver gray. (See "Precautions" on page 4)

Topping—One day after the underbed and strips are laid, saturate the underbed with water, and remove the excess before laying the terrazzo topping. In order to meet the recommendations of the National Fire Protection Association, no dimension of any chip shall exceed one-quarter inch. The colors and sizes of the marble aggregate shall be chosen by the architect. Here again, the chips and cement are added to a mechanical mixer and wet to the proper consistency by the addition of exactly 5 gallons of water to each bag of cement used. This is mixed thoroughly without any concern as to time. The acetylene black is prepared as a thin paste, by adding the powder to a 1½% solution of Isopropyl Alcohol in water (1½ lbs. of Isopropyl Alcohol added to 98½ lbs. of water). This paste is then added to the mix of chips and cement and is rotated in the mixer for a minimum of one, and a maximum of three minutes, carefully timed. The composition of the terrazzo topping shall be in the proportion of 200 lbs. of marble granules to 100 lbs. of gray or white cement to 2 lbs. of the dry weight of acetylene black. The mixed topping shall then be placed in the spaces formed by the dividing strips, and trowelled to the desired finish. A light rolling may be resorted to before the final trowelling. No additional water should be added to the floor at this time.

The surface of the terrazzo is not to be broomswept as with the normal terrazzo, but is left to harden. The floor is then covered with well-lapped Sisalkraft paper or equal, and kept wet for a minimum of fourteen days. Acetylene black terrazzo floors require a minimum of two weeks to cure sufficiently to attain the hardness necessary for grinding.

Surfacing—When the floors are sufficiently hard for grinding, they shall be machine rubbed in the presence of water, using 24 grit abrasive stones for the initial rubbing. They shall then be resurfaced, using 120 grit abrasive stones. These fine stones will assure a better surface contact. The floor shall then be grouted with a mixture made in the proportion of 100 lbs. of cement to 2 lbs of acetylene black. The grouting shall remain until the final cleaning, not less than seven days, when it shall again be resurfaced using 120 grit abrasive stones. All grinding shall be done in the presence of water.

Sealing—After the final grinding, the floors shall be treated with a penetrating type sealing compound, as recommended by member firms of the National Terrazzo & Mosaic Association. The sealing of the floors will prevent the absorption of objectionable liquids and bacteria.

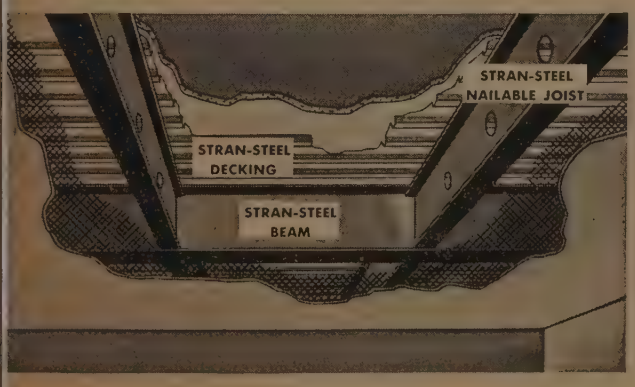
When the floors are tested by the method recommended by the Committee on Hospital Operating Rooms of the National Fire Protection Association, they should show when tested from surface to surface, and from surface to ground, a maximum resistance of 1,000,000 ohms and a minimum of 25,000 ohms. Records should be kept of the humidity in the rooms at times of testing, because humidity is one of the factors in conductivity.

STRAN-STEEL JOISTS REDUCE HEIGHT PER FLOOR, CUT LABOR TIME

Seventy tons of Stran-Steel joists were used to frame the classrooms of Crain Junior High School, Victoria, Texas.

Stran-Steel joists are designed to fit snugly between the flanges of Stran-Steel wide flange beams, as shown in the diagram of a typical installation below. This eliminates the need for dropped ceilings or boxed beams and reduces height per floor by one course of bricks or equivalent. Nailable Stran-Steel joists save time and labor, too. Metal lath and roof decking can quickly and easily be attached with ordinary hammer and nails. No welding is necessary. And pre-punched holes speed conduit installations.

Nailable joists and wide flange beams are part of a complete Stran-Steel building system of space saving structural components for commercial or industrial construction, single or multi-floor. Its unique advantages and design flexibility make it well worth investigating. For information, contact your nearest Stran-Steel Architectural Products dealer. He's listed in the Yellow Pages under *Steel*. The Stran-Steel Structural Systems catalog can be found in Sweet's Catalog—index 2C/Str.



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For More Information, Use Postage-Free Postcard at Back of Book

How to specify beauty like this for concrete floors

STEP 1. Apply MULTI-CLEAN *Concrete Hardener* and *Etcher*. This cleans, etches and hardens in one operation. It etches by opening up pores so seals can penetrate; it hardens by chemically converting soluble materials in concrete to insoluble. Makes floor more resistant to dusting, chipping, and wear.

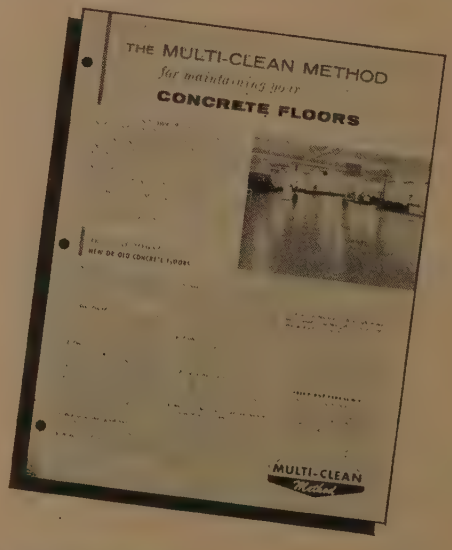
STEP 2. Next, apply 2 coats of MULTI-CLEAN rubber-based *Neo-Dry Concrete Sealer* with wide brush or applicator. Available in "natural" as well as black, white, green, tile red, gray or brown. Resistant to both acids and alkalis and dries within an hour.

STEP 2. (Alternate) If concrete floors will be subjected to spillage of solvents such as gasoline, naphtha, etc., follow *Hardener* and *Etcher* with 2 applications of MULTI-CLEAN *Concrete Preserver*. Also available in black, white, green, tile red, gray, brown, and natural. *Concrete Preserver* stops dusting, chipping, and gives excellent long-lasting resistance to chemicals and greases.

STEP 3. When dry, finish with MULTI-CLEAN *Anti-Slip Waterproof Wax*. This is a self-polishing, water emulsion, carnauba-based waterproof wax with unusually long service life.

How MULTI-CLEAN Can Assist You. There's a separate scientific MULTI-CLEAN METHOD for the initial treatment and preservation of the beauty of *every type floor*. It includes the *right materials*, the *right equipment*, and the *right technique* for each.

When you specify the MULTI-CLEAN METHOD for any type floor, you know it will look better, last longer, and cost less to maintain. It will be a floor your client will be truly proud to own.



See 8-page Multi-Clean Insert in Sweet's Architecture File, pages 13m MU

Complete Specifications for proper treatment of all type floors *(use the card at the back of this bulletin to order your free copy)*

Here, in handy perforated "tear-out" form, are complete specifications for treatment of all type floors.

Bound ten-sheets-to-a-pad, there are separate sections for asphalt tile, concrete, rubber tile, terrazzo and oxychloride, vinyl and vinyl asbestos, and wood. Ceramic tile, cork, linoleum and marble are also included.

These specifications are based on the scientific MULTI-CLEAN METHOD. They cover initial treatment of new floors, future maintenance, and restoring the new look to old floors. Both long and short forms are included for your convenience.

Expert local consultants. A trained MULTI-CLEAN floor maintenance specialist is available in every metropolitan area where there is a Chapter of The Producers' Council. He'll be glad to assist you in every floor care problem you may have. If he's not listed in your telephone directory, write to MULTI-CLEAN PRODUCTS, INC., St. Paul 16, Minnesota, for his name.

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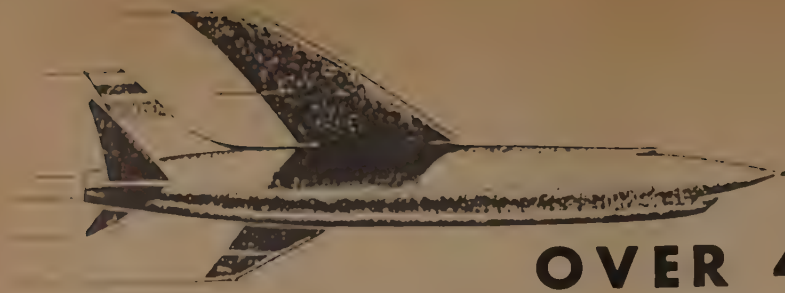
MULTI-CLEAN® Method

AIA FILE NO. 25-G



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OVER 45,000 SQ. FT.

Part of the ticket lobby, Port Columbus Air Terminal. Architects: J. E. Greiner Co., Baltimore.

The Hillyard "Maintaineer®"
will be glad to recommend specialized treatments for the floors in your building—act as your "Job Captain" while the treatments are being applied. Consider him your own technical consultant,

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OF HILLYARD-TREATED TERRAZZO!

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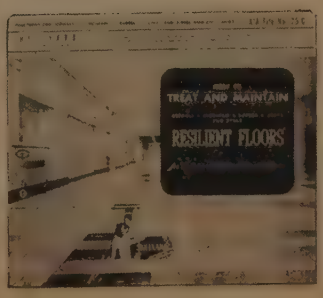
This building is in the shape of a Y, with a graceful tower where the wings join. It combines beauty of modern design with efficiency for handling and routing large numbers of people.

Attention focuses on the 45,000 square feet of terrazzo flooring, treated with Hillyard Onex-Seal. The day after dedication, after more than 150,000 visitors had thronged through the building, observers commented on the floors' unblemished appearance.

Hillyard specialized treatments for terrazzo will *keep* this attractive and durable flooring in top condition. For example, the terrazzo floor in the Chicago Daily News-Northwestern Railroad ramp has seen 25 years of service and the traffic of an estimated 200,000,000 people since it was installed and Hillyard-treated. Today it is still beautiful!

Are Your Floor Treatment Files UP TO DATE?

Be sure you have latest editions of these Hillyard Floor Treatment Files, AIA No. 25G. Contain product information, draft specifications, and detailed application instructions which your contractor will find useful. Sent free on request.



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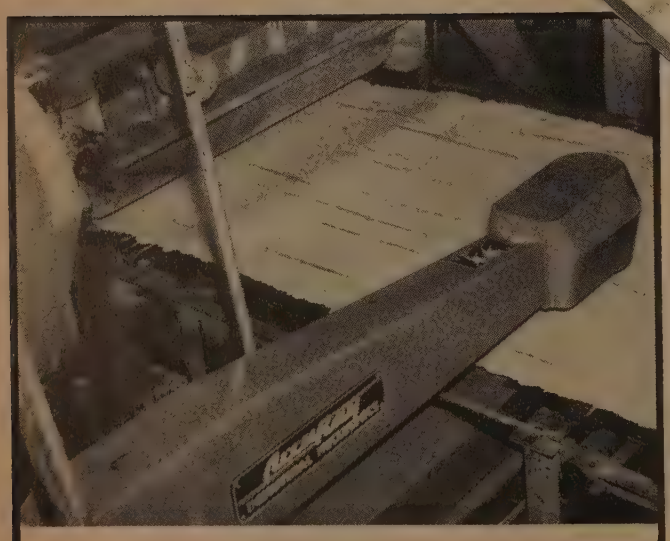

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Automatic recorder charts tolerances. This visual "profile" of quality allows constant improvements in formulation for an ever-better product.

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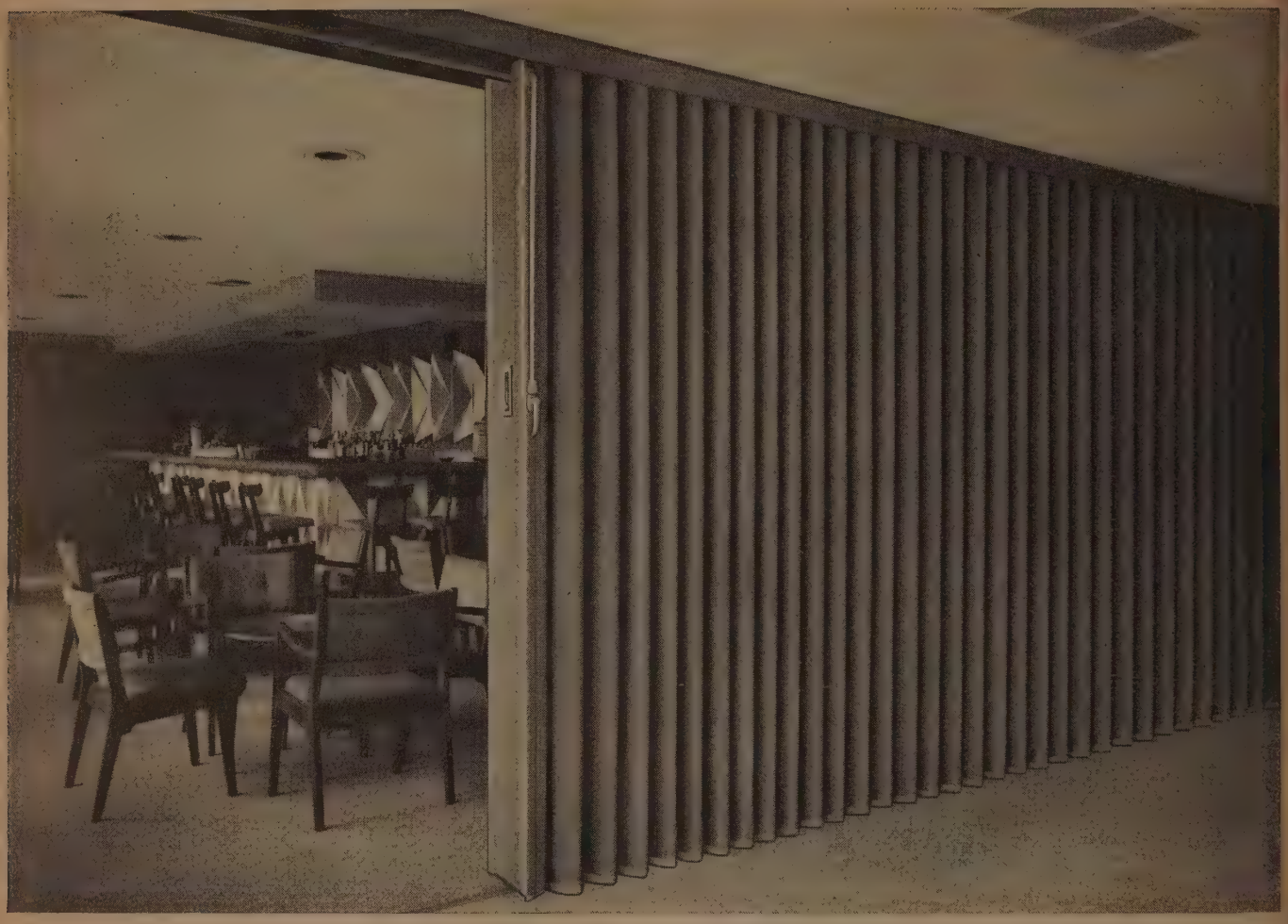
NEW DUAL SOUND-RETARDANT FOLDOOR PARTITION



Installation: HEART OF ATLANTA MOTEL — Warner Morgan, Architect — Atlanta — Barge & Co., Contractor-Builder — Atlanta

. . . meets the most demanding space-and-sound separation requirements

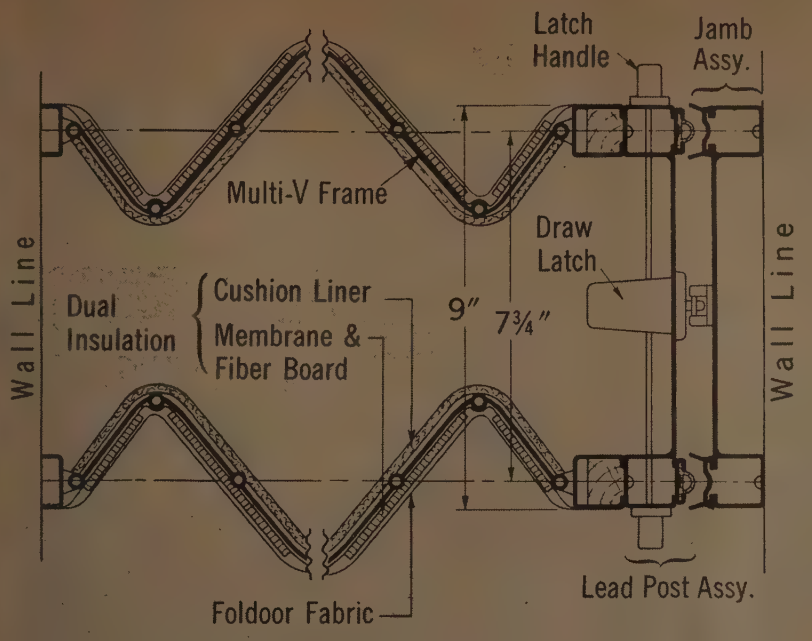
Wherever sound as well as space separation is a major problem—in ballrooms, restaurants, auditoriums, hotels, motels, churches, schools, hospitals, social centers, plant recreation areas, offices, mortuaries, and all other applications . . . the new Holcomb & Hoke DUAL SOUND-RETARDANT FOLDOOR PARTITION is the answer. For any double-use facility, new or remodeled—it marks the first time that the convenience and beauty of the fabric-covered folding door are available in a general purpose, improved sound-retardant partition that operates from overhead tracks only.

Laboratory tests show that the DUAL SOUND-RETARDANT FOLDOOR PARTITION provides maximum sound insulation over a wide range. Actual installations, like the one shown above, prove its practicality wherever sound separation is a problem.

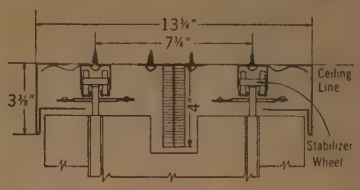
FOLDOOR sound-retardant values:

The DUAL SOUND-RETARDANT FOLDOOR PARTITION, with bottom sweep strips and baffle header, is equivalent in sound reduction to the following types of standard construction materials:

- **Two well-fitted parallel panel doors with 2″ separation**
- **Three inch solid wood door with cracks sealed**
- **Three inch solid Gypsum tile wall**
- **Two inch solid Gypsum tile wall with ½″ plaster**
- **Wood stud wall with metal lath and Gypsum plaster**

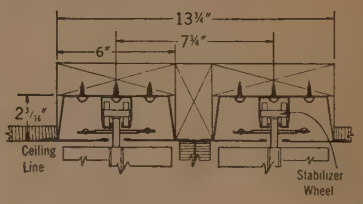


Typical stacking dimensions: 2¼" per foot of opening width plus 3¼" for posts. In partitions 14' and higher add 1⅛" for reinforced fixed jamb to the post allowance. Stack space for a partition with rolling post measures 2¼" per foot of opening width plus 6⅝".



End View: Concealed Surface Track and Lead Post Assembly

Construction Details



End View: Recess Head Details

New structural design and insulation minimizes sound transmission

Double Units in Minimum Space • DUAL SOUND-RETARDANT FOLDOOR PARTITION consists of *two* special sound-retardant Multi-V FOLDOOR units, back to back on parallel tracks, operating as a single partition with a joined lead post. (Details of Multi-V construction can be found in the FOLDOOR A.I.A. Catalog and in Sweet's Architect File.) This partition is made for concealed surface and recess installations with semi-concealed straight tracks. Pivot switches are available for added flexibility in space separation.

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Thus, the sound waves vibrating the insulation on the receiving side are structurally isolated to prevent physical transmission to the other dual unit. Filtered sound waves that penetrate the first unit, cross the dead air space and are then dampened and absorbed by the insulating elements of the second unit. A vertical baffle, suspended from ceiling between the tracks, retards passage of sound over partition.

Built for Efficiency—Durability • Two insulated frames are joined at leading edges by a steel lead post assembly. Special sound-retardant mouldings are provided on lead post and jamb assemblies to cut sound transmission. Lead post assembly and jamb assembly are covered with matching door fabric. Horizontal stabilizer wheels, in lead post trolley assemblies, bear against sidewalls of the tracks, providing smooth, parallel tracking.

Check these FOLDOOR advantages:

- ✓ **Minimum space requirements**
- ✓ **Easy to operate**
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- ✓ **Will not bind from slight ceiling sag**
- ✓ **Beautiful decorative fabrics**
- ✓ **All meeting points tightly sealed**
- ✓ **Installed weight is approximately 5.25 pounds per square foot, about half of which is represented by the four dense layers of complementary insulation.**

For complete details, call your FOLDOOR installing distributor, listed under "Doors" in the Yellow Pages, or write

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All the translucent depth of true marble!

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SUGGESTED APPLICATION: Kentile Crystalite Vinyl Tile is exactingly designed for fine residential floors. Also for commercial areas removed from direct street traffic. Using Kentile Crystalite Adhesive, it can be installed on indoor floors above grade. For installations over concrete in contact with the earth, use Kentile Epoxy Adhesive.

Your Kentile Representative will be happy to show you samples of this beautiful new world of flooring luxury.

SPECIFICATIONS

COLORS:	Doric White (CV-1) Trojan Alabaster (CV-2) Corinthian Gold (CV-3) Athenian Pink (CV-4) Ionian Gold (CV-5) Theban Jade (CV-6)
SIZES:	Standard: 9" x 9", 12" x 12", 37" x 37" (untrimmed) Special: 9" x 18", 18" x 18", 24" x 36", 36" x 36"
THICKNESS:	1/8"
FEATURE STRIP: Bright Gold and Bright Silver	Standard: 1" x 36", 1/8" x 36", 1/4" x 36" Special: 1½" x 36", 2" x 36"

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KENTILE WOODGRAIN® VINYL in Planks and Tiles

All the handsome glow of wood—without the care!

This wonderfully *natural* Woodgrain Vinyl Flooring brings you all the rich luster of beautifully-cared-for wood... *without* the care! Each tile and plank is Vinyl *through and through*. The floor is greaseproof, waterproof, and extra resilient. Kentile Woodgrain Vinyl is easy to clean . . . and it wears just as beautifully as it looks. There's no refinishing—ever. No dust-collecting cracks. Tiles and planks available in Birch, Teak, Mahogany, and Limed Oak.

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Your Kentile Representative will be happy to show you samples. For prompt action, just give him a call!

SPECIFICATIONS

COLORS:	Tiles: Limed Oak (R-53) Mahogany (R-50) Teak (R-52) Birch (R-51) Planks: Limed Oak (PL-4) Mahogany (PM-2) Teak (PT-3) Birch (PB-1)
SIZES:	Standard Tile: 9" x 9" Standard Plank: 4" x 36"
THICKNESSES:	(Both) Standard Gauge (.080) and 1/8"

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One of several Prudential lobbies made even more attractive with latex paint.

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The 21-story building of the Prudential Insurance Company, Houston, Texas, has latex paint on many interior surfaces—executive offices, working divisions and lobbies.

This handsome paint is made with styrene-butadiene latex to assure an elastic coating for uniform surface, lasting beauty and resistance to repeated washings. Prudential's Southwestern Home Office is an example. Easy application, fast dry and lack of painty odor are among the other features that make latex paint popular with architects. There's a wide range of colors to provide the effect you wish —easily, economically, positively!

These are examples of how you benefit from our persistent research to provide paints with tomorrow's benefits today.

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2 DRY WALL CONSTRUCTION . . . Latex paints give excellent results. On new construction, two coats of a latex paint are usually required. As on any surface, latex paints leave a durable, washable surface.

3 INTERIOR BLOCK . . . Latex paints have excellent sealing properties over cinder block, concrete block and other porous surfaces. Usually two coats are required to give the desired covering.

4 EXTERIOR MASONRY . . . Latex paints offer maximum durability under weathering . . . resist sun, fog, mildew . . . seal out dirt, moisture. Alkali resistant. Two coats are usual for stucco and masonry.

5 FIBERBOARD . . . Latex paints provide an effective seal coat for long, satisfactory service on wallboard. Several coats of a latex paint are sometimes used to establish a moisture-vapor barrier.

6 GYPSUM BOARD . . . Latex paints are particularly good for this application. They do not strike in and photograph through plaster patching or over nail holes and seams.

7 WALLPAPER . . . Latex paints cover wallpaper readily. Seal the porous paper surface. Hold out dirt, stains and moisture. Assure smooth, uniform finish.

8 PRIMED WOOD AND METAL TRIM . . . Because latex paints contain water, it is best to prime wood and metal with an oil primer to prevent contact with bare surfaces.

For additional information, see your paint supplier. Dow does not make a latex paint but is a leading supplier of latex to progressive paint manufacturers.

For a list of leading latex paint manufacturers, write: THE DOW CHEMICAL COMPANY, Midland, Michigan—Plastics Sales Department PL1834R.

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INDEX

of Products, Specifications and Technical Information

AIR CONDITIONING
American-Standard ---- 9

CELLULAR FLOOR CONSTRUCTION
Inland Steel Products Company ---- 15-17

CEMENT
Medusa Portland Cement Company ---- 39-40

CERAMIC TILE
Mosaic Tile Company ---- 33-34
Pomona Tile Manufacturing Company ---- 51-52
Robinson Brick and Tile Company ---- 49-50

CLOCKMASTER
Minneapolis-Honeywell Regulator Company ---- 69-70

COMPOUNDS, GLAZING, CAULKING & SEALING
Dicks Armstrong Pontius ---- 29-30

DOOR CLOSERS
Norton Door Closer Company ---- 47-48

DOOR HARDWARE
The Stanley Works ---- 41-42

DOORS
The Peele Company ---- 71-72
U. S. Plywood Corporation ---- 94

ELECTRICAL DISTRIBUTION SYSTEMS
Frank Adam Electric Company ---- 26-27

ELECTRICAL SUPPORTS
Unistrut Products Company ---- 76

FASTENING SYSTEM
Ramset Fasteners, Inc. ---- Back Cover

FLOOR TREATMENT MATERIALS
Hillyard Chemical Company ---- 84-85
Multi-Clean Products Company ---- 82-83

FLOORING

Armstrong Cork Company ---- 23-24
Azrock Products Div., Uvalde Rock Asphalt Co. ---- Inside Front Cover
Congoleum Nairn, Inc. ---- 37-38
Kentile, Inc. ---- 90-91
Mastic Tile Corp. of America ---- 86-87

FOLDOOR PARTITIONS

Holcomb & Hoke Mfg. Company ---- 88-89

GLASS

Libbey-Owens-Ford Glass Company ---- 35-36

INSULATION

Dow Chemical Company ---- 12-13

LATEX PAINT

Dow Chemical Company ---- 92-93

LIMESTONE

Indiana Limestone Company ---- 31-32

LUMBER

West Coast Lumber Inspection Bureau ---- 22

MOVABLE PARTITIONS

Unistrut Products Company ---- 75
U. S. Plywood Corporation ---- 95

PLUMBING FIXTURES

American-Standard ---- 10
Crane Company ---- 2-3
Swedish Crucible Steel Company ---- Inside Back Cover

SHOWER FLOORS

Fiat Metal Mfg. Company ---- 20-21

STEEL FRAMING

Stran-Steel Corporation ---- 11 & 81
Truscon Steel Div., Republic Steel Corp. ---- 73-74
Wheeling Corrugating Company ---- 17-18

STRUCTURAL CLAY PRODUCTS

Natco Corporation ---- 43-44

TERRAZZO

National Terrazzo Mosaic Association ---- 77-80

WEATHERSTRIPPING

Monarch Metal Weatherstrip ---- 45-46

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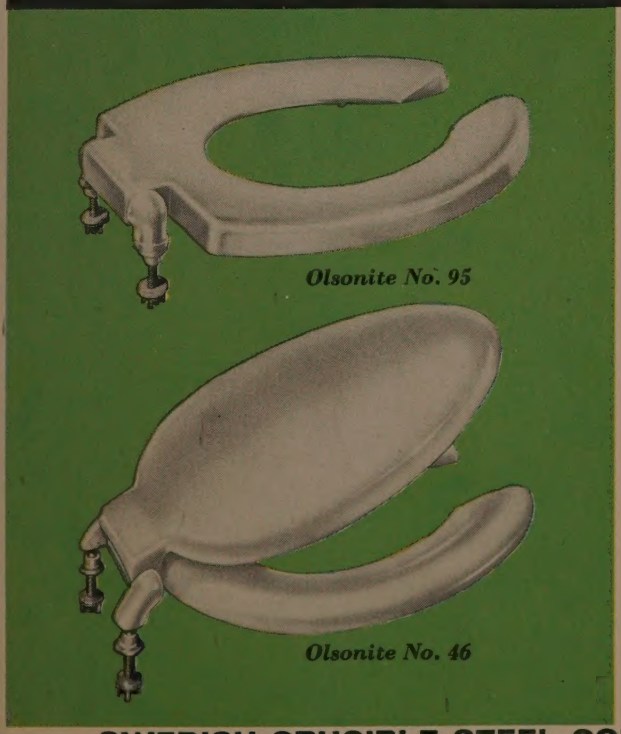

The newest and one of the finest building groups in the South is Dallas' new Southland Center. This $35 million project combines a 42-story office building—Southland Life Tower—an ultra modern 600-room luxury hotel, and a 2,500-car daily capacity underground garage. Foundation provisions have also been made for a future 32-story office building.

Two important features guided the selection of office and hotel appointments: low maintenance and attractiveness. As a result—Olsonite No. 95 white seats were selected for the office building; Olsonite No. 46 white and plain colored seats for the hotel. Both Olsonite models are of one piece construction with no applied finish of any kind. For an Olsonite catalog, please write on your letterhead to:

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58-A2

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Like *every* RAMSET fastener, it is processed to provide an enormous safety factor for its specified application. The figures below further illustrate the power of RAMSET studs set into steel by RAMSET Powder-Actuated tools. Similar figures apply to RAMSET in *concrete* where pull-out loads are comparable to those of steel tests.

Holding power of RAMSET Studs in steel

Pittsburgh Testing Lab Test No. 397709

Plate Thickness	Fastener Number	Average Depth Penetration	Average Pull-Out Load
¼"	2402 [1]	2½"	2330 lbs
¼"	2402 [1]	2½"	2020
⅜"	2402 [1]	2⅜"	3040
⅜"	2402 [1]	2½"	3100
⅜"	3441 [2]	1⅝"	3000
⅜"	3441 [2]	1⅝"	3080
½"	2402 [1]	2⅝"	2400
½"	2402 [1]	2⅝"	2120
½"	3441 [2]	1⅝"	5230
½"	3441 [2]	1⅝"	5490
⅝"	2402 [1]	1⅞"	1680
⅝"	2402 [1]	1⅞"	1470
⅝"	3441 [2]	1⅞"	7080
⅝"	3441 [2]	1⅞"	7100

[1] formerly fastener 2204 [2] formerly fastener 3604

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